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JAMS

CENTURY PRODUCTS, LLC, a  
California limited liability  
company,

CLAIMANT,

vs.

CENTURY-BOARD USA, LLC, a New York  
limited liability company; ECOMAT  
NEVADA, INC., a Nevada corporation;  
and WADE BROWN, an individual,

RESPONDENTS.

CENTURY-BOARD USA, LLC, a  
New York limited liability  
company,

Counter-Claimant,

vs.

CENTURY PRODUCTS, LLC, a California  
limited liability company;  
JOHN TAYLOR, an  
individual; and Fyodor Shutov,  
PhD., an individual,

Counter-Respondents.

Reference No.: 1220033832  
VOLUME III

ORIGINAL

CONFIDENTIAL  
CONFIDENTIAL

\*CONFIDENTIAL\*

DEPOSITION OF WADE BROWN, VOLUME III

SAN DIEGO, CALIFORNIA

NOVEMBER 21, 2005

ATKINSON-BAKER, INC. COURT REPORTERS  
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REPORTED BY: AMORITA A. LEDESMA, CSR NO. 12852

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CENTURY PRODUCTS, LLC, a  
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CENTURY-BOARD USA, LLC, a New York )  
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Reference No.: 1220033832  
VOLUME III

CONFIDENTIAL

Deposition of Wade Brown taken on  
behalf of Mr. Robinson, at 450 B Street, Suite 2000,  
San Diego, California commencing at 9:33 a.m., Monday,  
November 21, 2005, before Amorita A. Ledesma, CSR No.  
12852.

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I N D E X

WITNESS: WADE BROWN

EXAMINATION	PAGE
By Mr. Robinson	427

EXHIBITS

NUMBER	CLAIMANT'S DESCRIPTION	PAGE
4	One-page document entitled Identify from Exhibit 3 the Following.	504
5	51-page document Bates stamped CB02034 through CB02095.	504
6	31-page document entitled Transmittal letter to the United States Receiving Office.	560
7	16-page document entitled In the United States Patent and Trademark Office.	567
8	10-page document Bates stamped CB02044 through CB02053.	579
9	90-page document.	591
10	Two-page document entitled Trade Secrets - Century-Board.	592

LETTER	RESPONDENT'S DESCRIPTION (NONE)	PAGE
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QUESTIONS WITNESS INSTRUCTED NOT TO ANSWER:

PAGE 553      LINE 25

INFORMATION TO BE SUPPLIED:

PAGE 570      LINE 21



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WADE BROWN,  
having been placed under oath, testified as follows:  
  
EXAMINATION  
  
BY MR. ROBINSON:  
  
Q. Good morning, Mr. Brown. As you know, my name  
is Robert Robinson. I'm one of the attorneys  
representing Century Products in this matter, and there  
are a few areas that I'm going to take the lead in  
inquiring into. We talked about this with your counsel,  
and as I understand it, it's acceptable to counsel to  
let me ask you questions.  
  
MR. JULANDER: Yes.  
  
BY MR. ROBINSON:  
  
Q. When we left Friday, you were going to look at,  
I believe, the list of trade secrets that are set forth  
in what is deposition Exhibit 3.  
  
A. Yes.  
  
Q. And you were going to identify certain items  
off that list of trade secrets that we hadn't talked  
about previously.  
  
A. Correct.  
  
Q. And have you completed that?  
  
A. Yes, I have.  
  
Q. Okay. So, why don't we go through that, and I  
believe what you were going to do was identify those

1 items that are still trade secrets. Tell me what you  
2 did rather than me telling you what I thought you did.

3 A. These are trade secrets at the time we started  
4 Century Products -- no. Is that right? No. I  
5 shouldn't say that.

6 These are trade secrets that were used in the  
7 development of the Anaheim facility and are still being  
8 used by the Anaheim facility regardless of the patents.  
9 I hope I got that right.

10 Q. Okay. Fine. Let's go down that list.

11 A. Okay. It's quite a few.

12 Q. All right. But these are items that are not  
13 trade secrets now?

14 A. Some of them are not trade secrets.

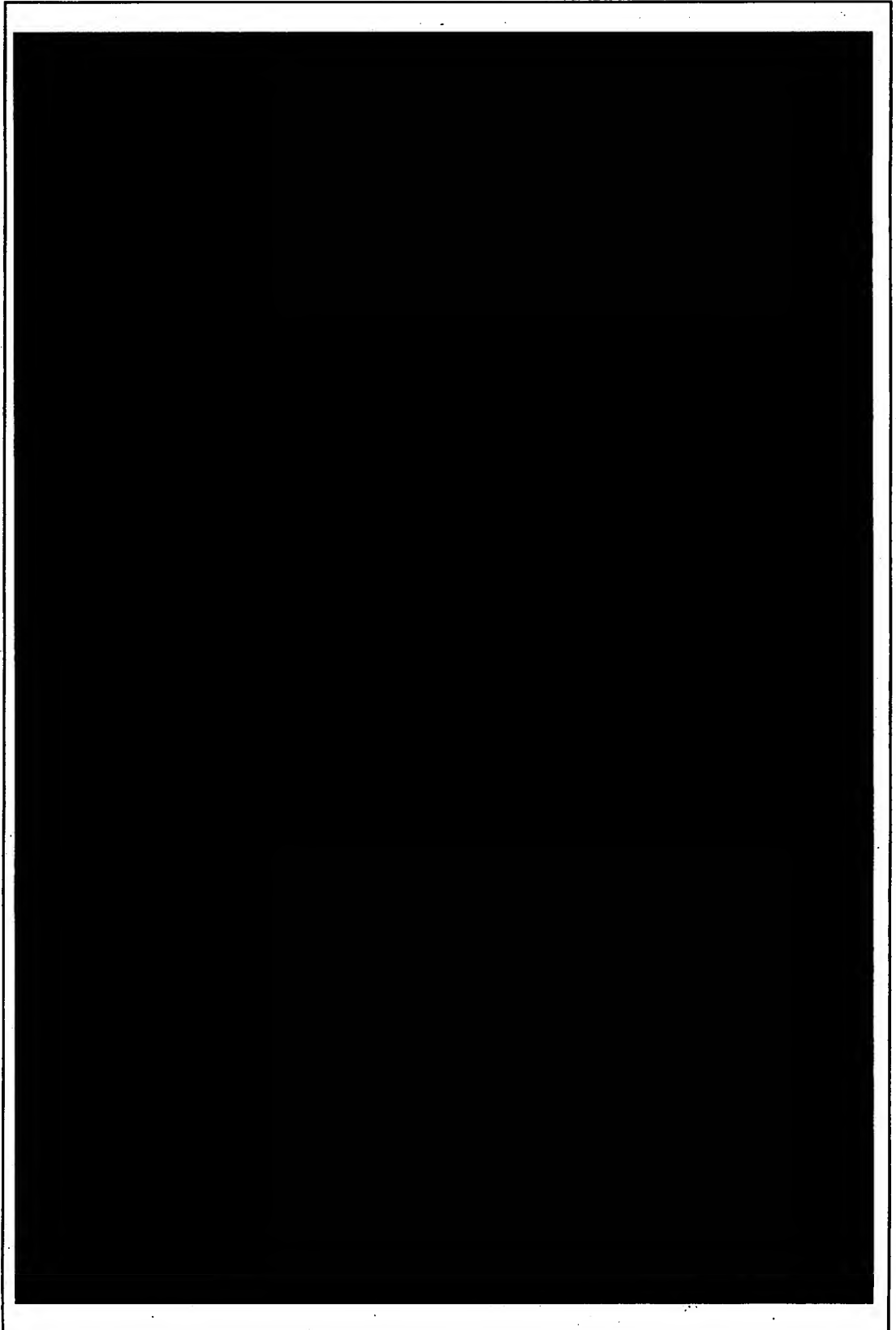
15 Q. Some of them are not now?

16 A. That's correct.

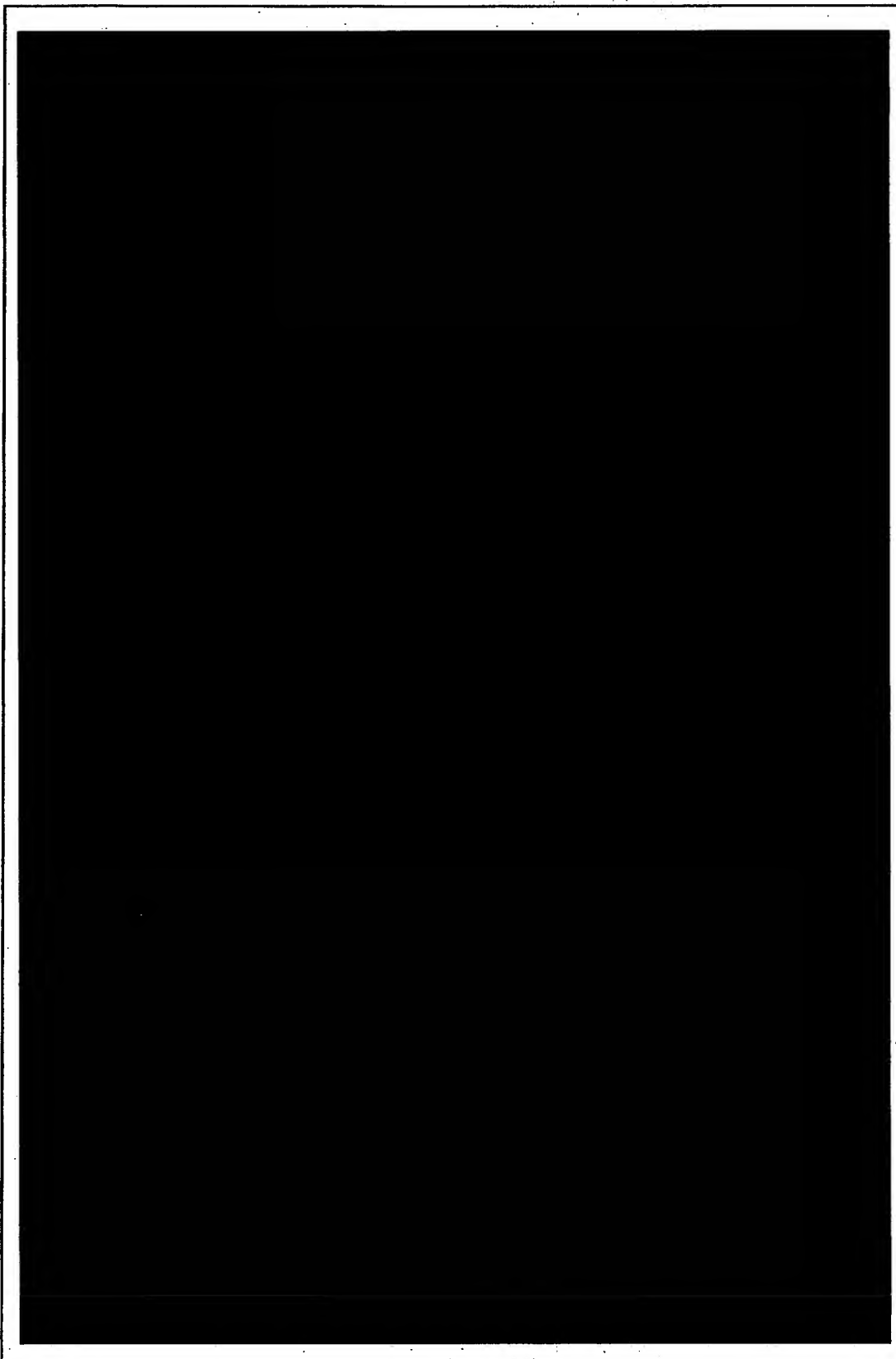
17 Q. Well, let's start at the beginning and go  
18 through the list.

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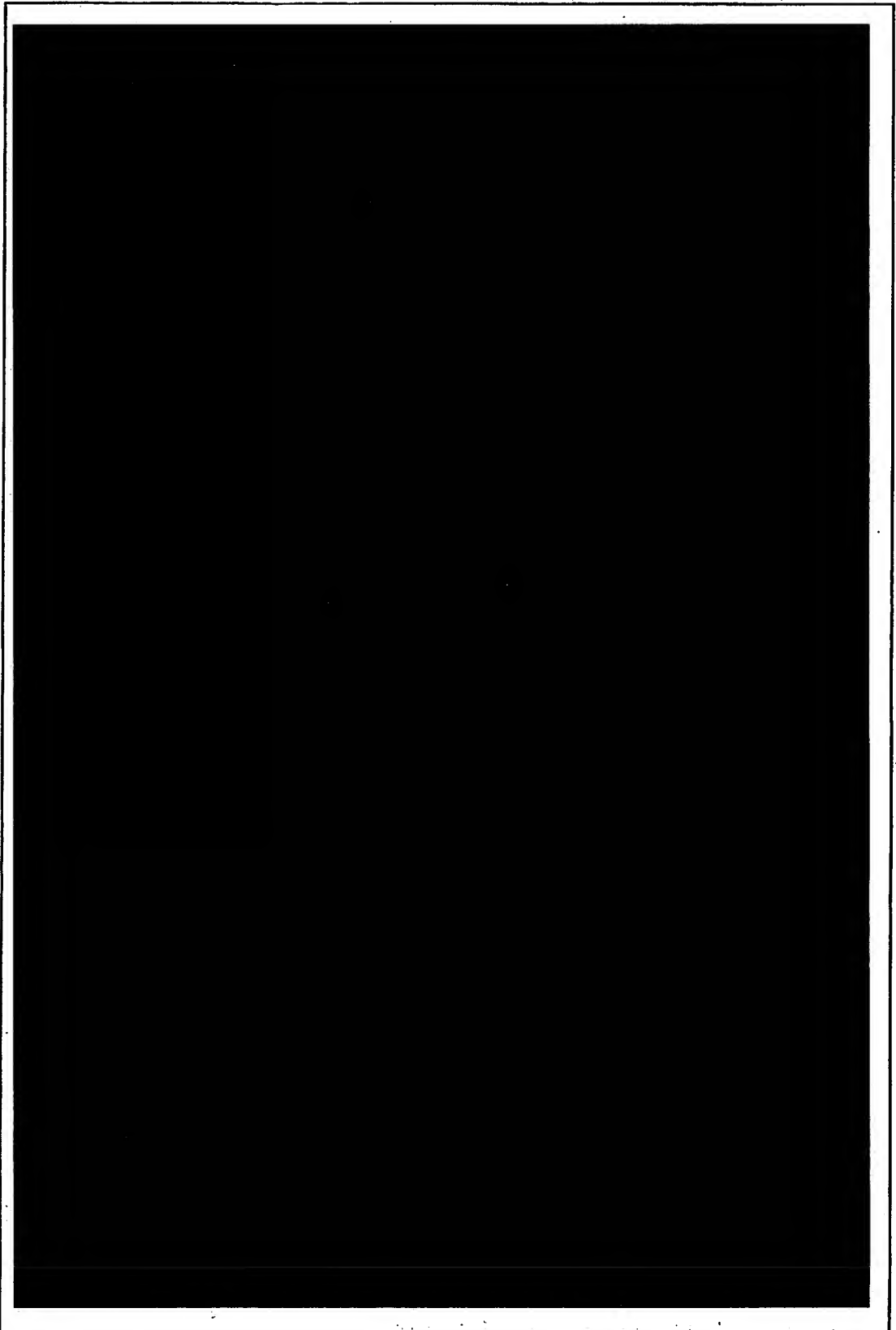
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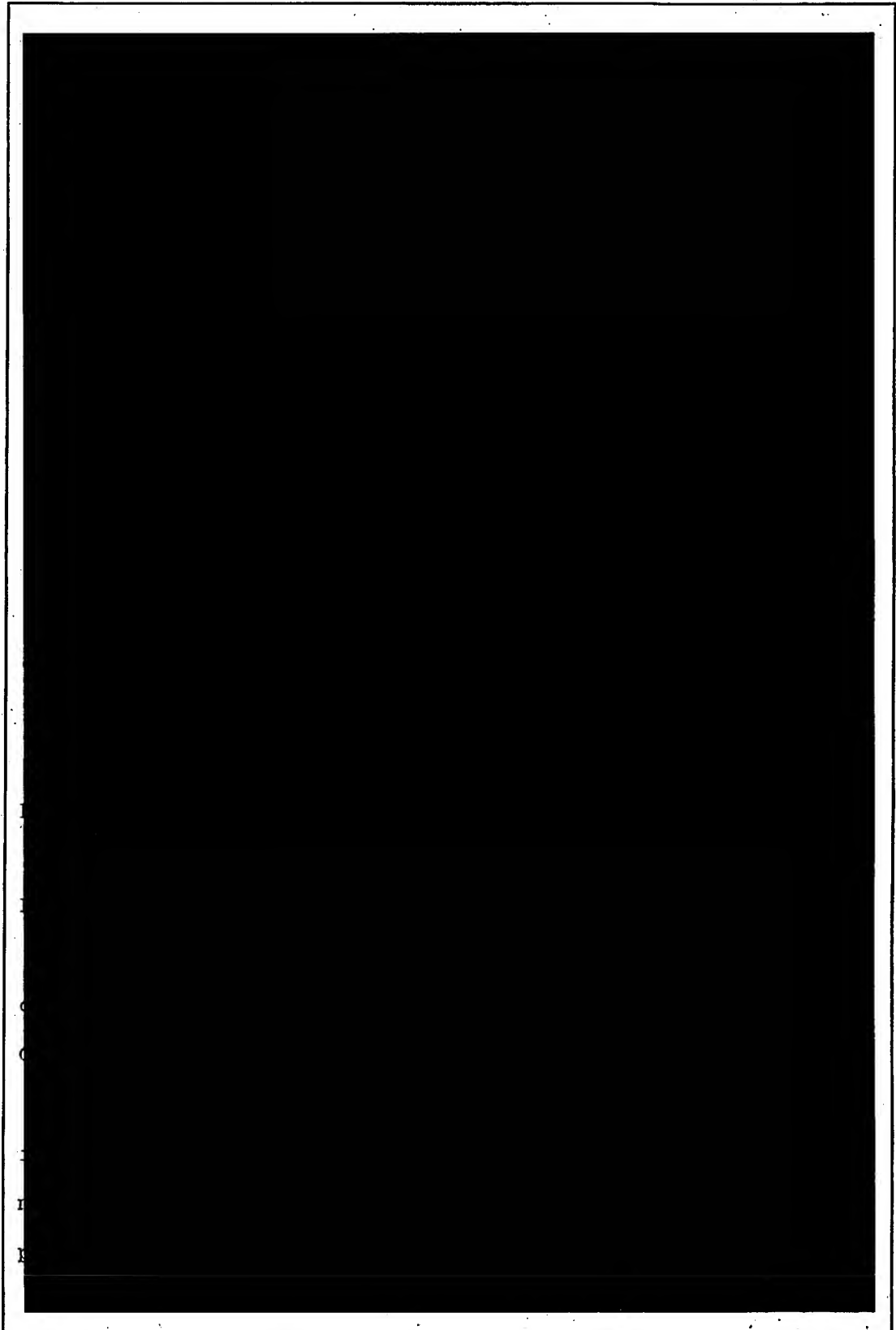
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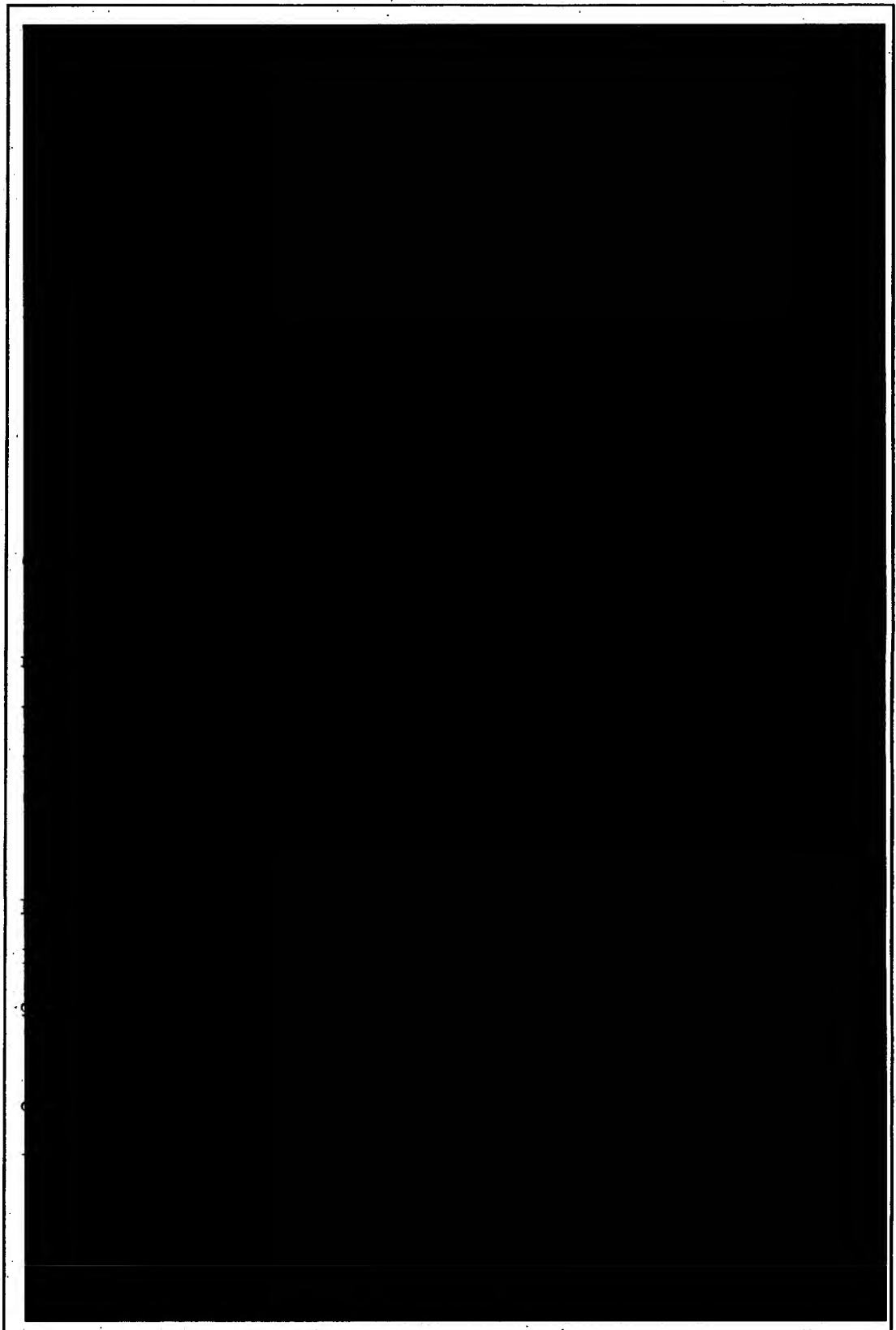
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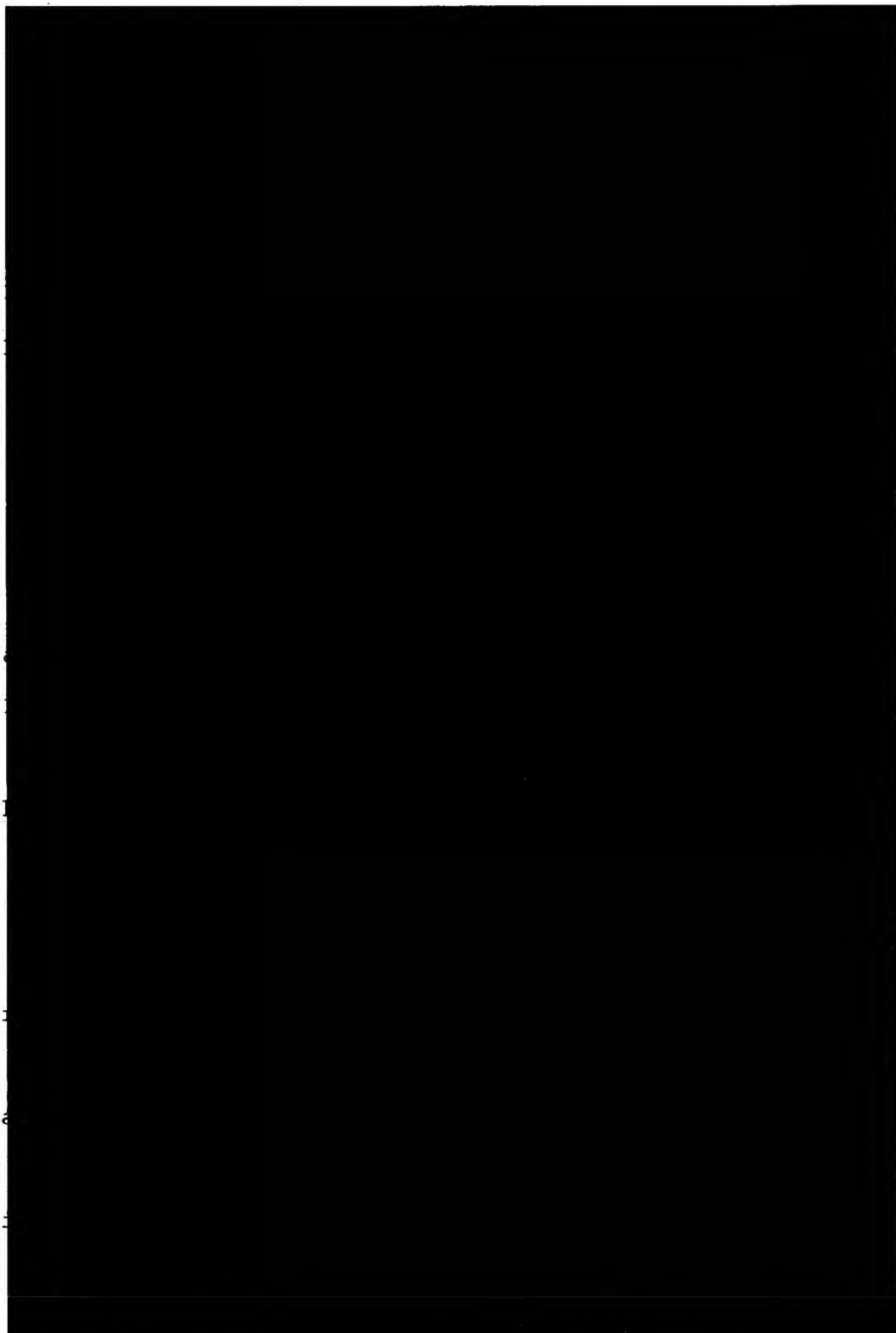
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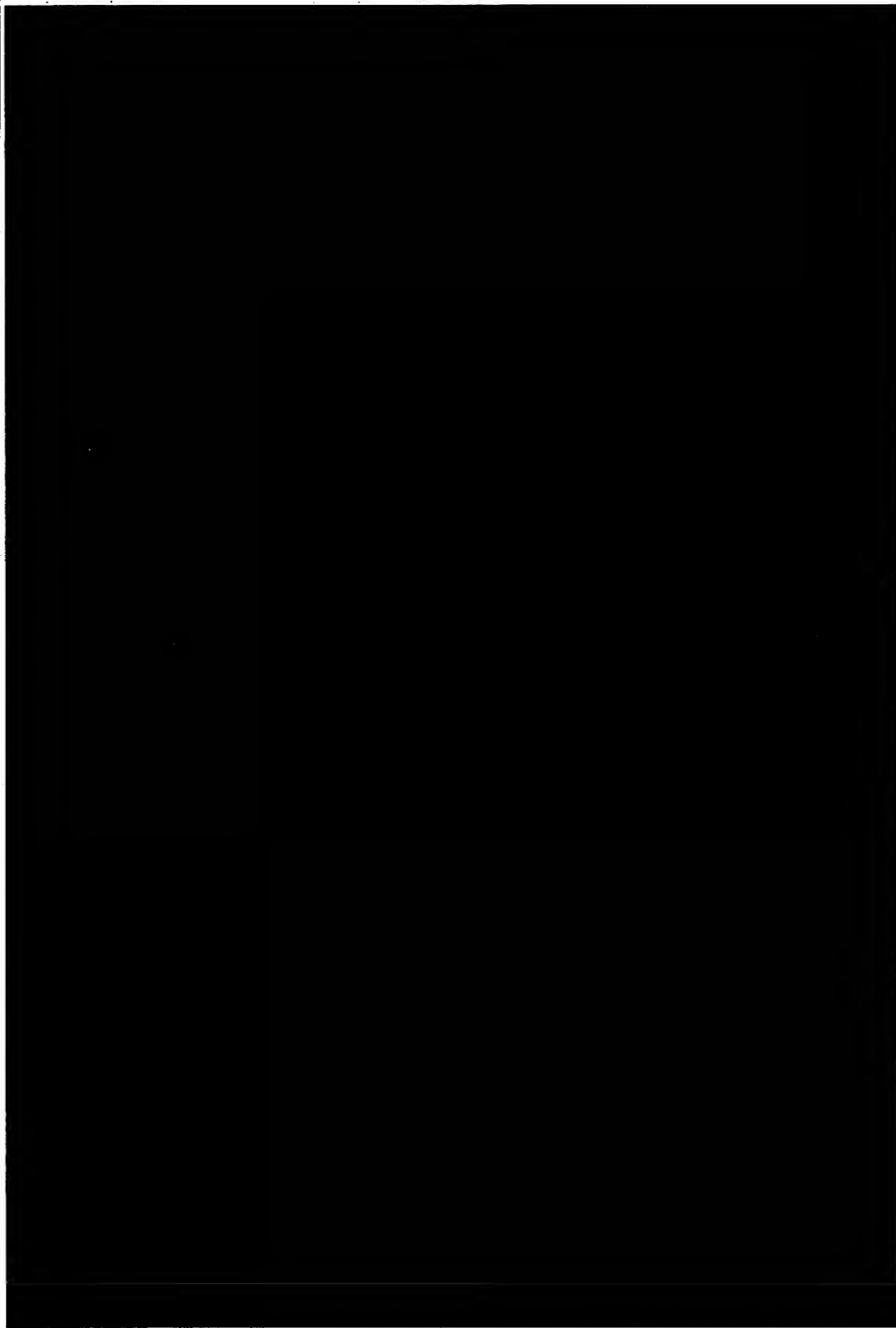


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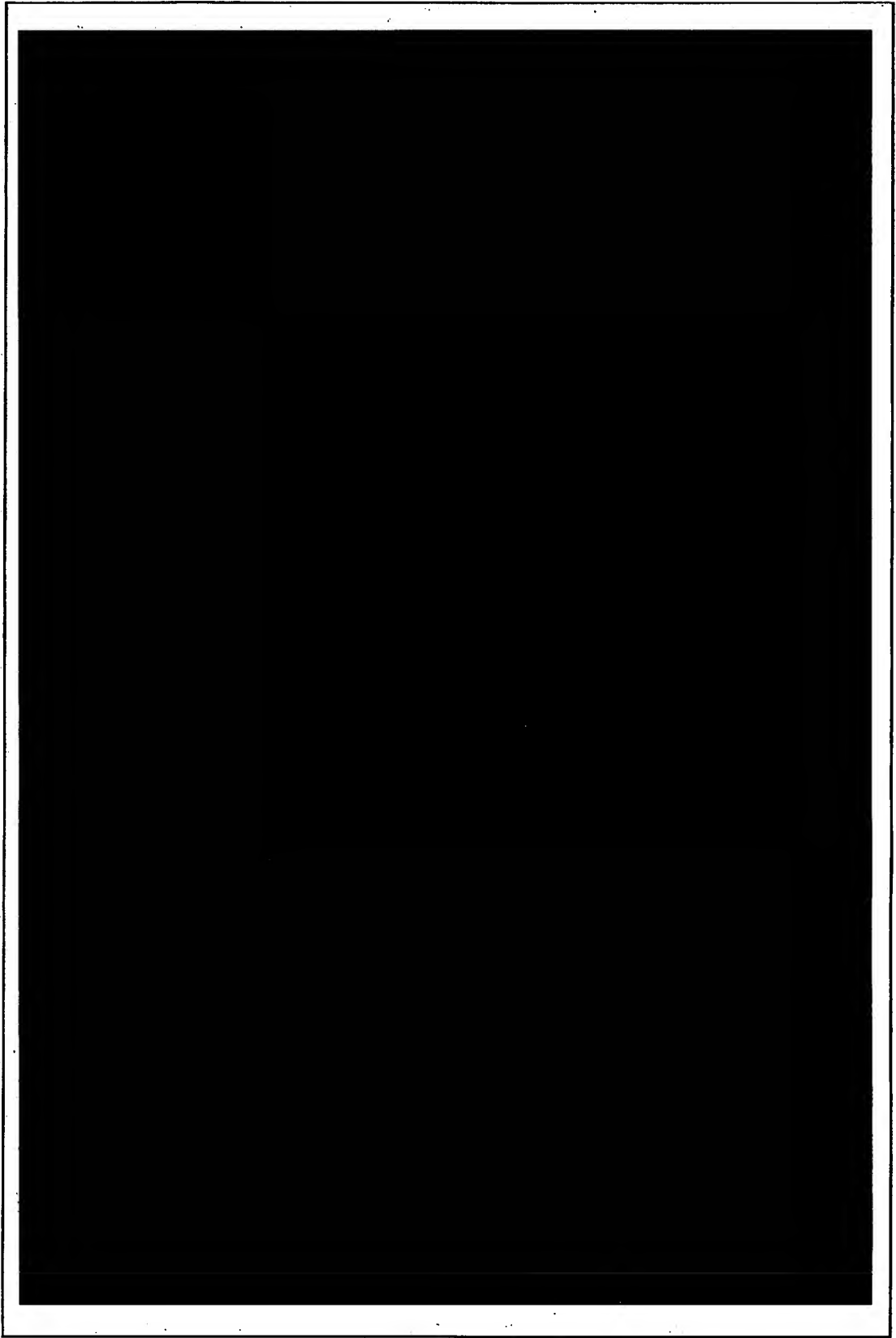




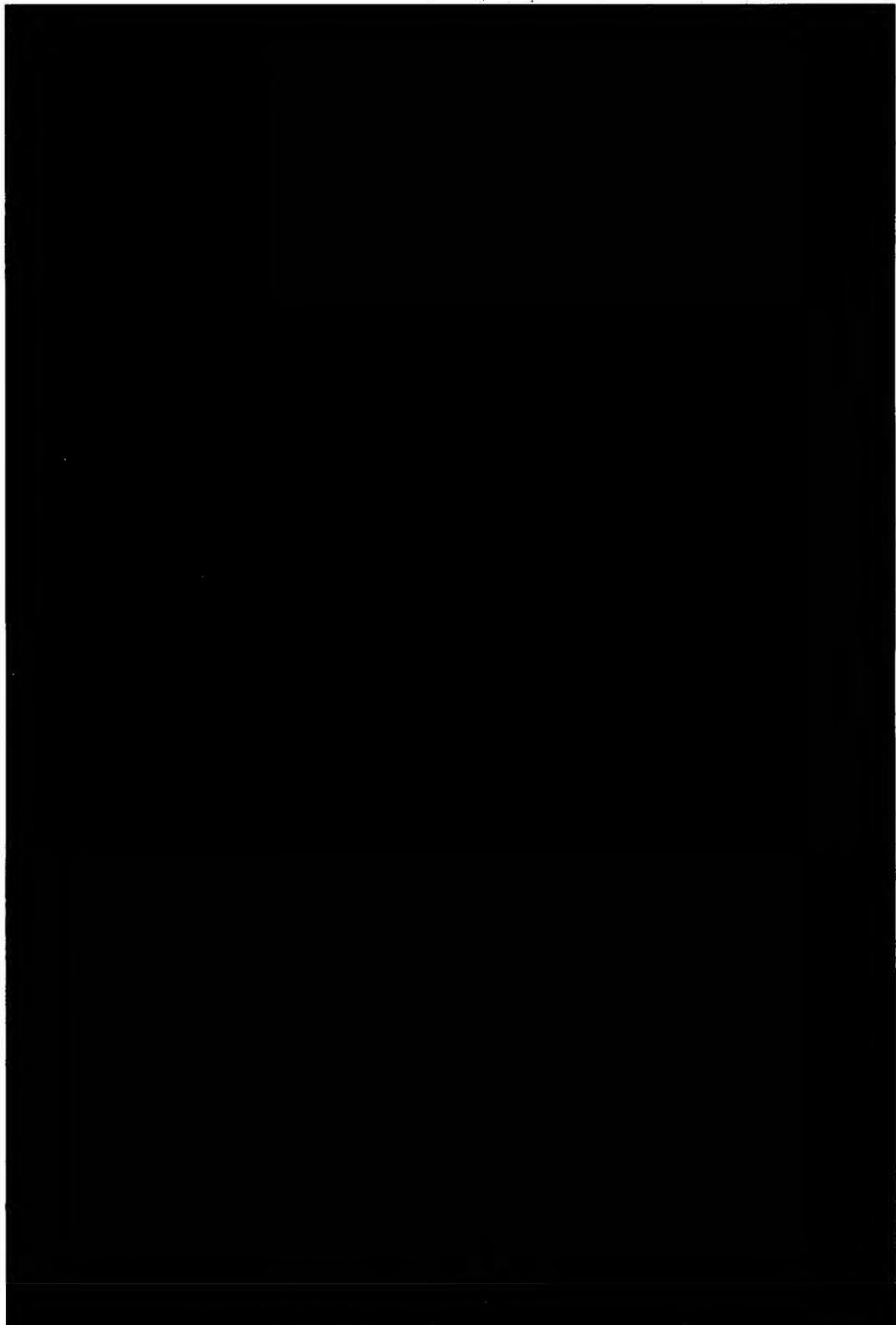
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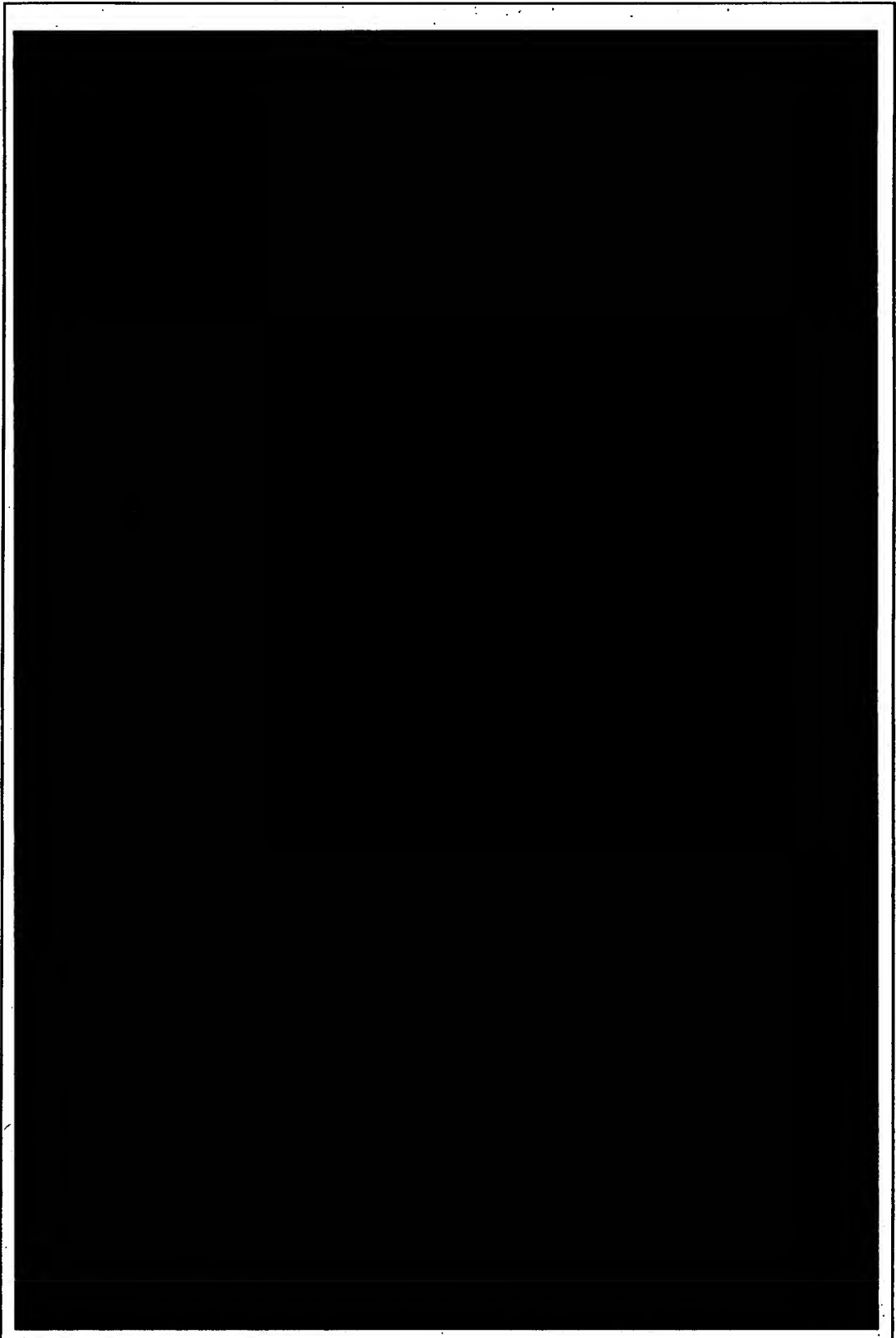
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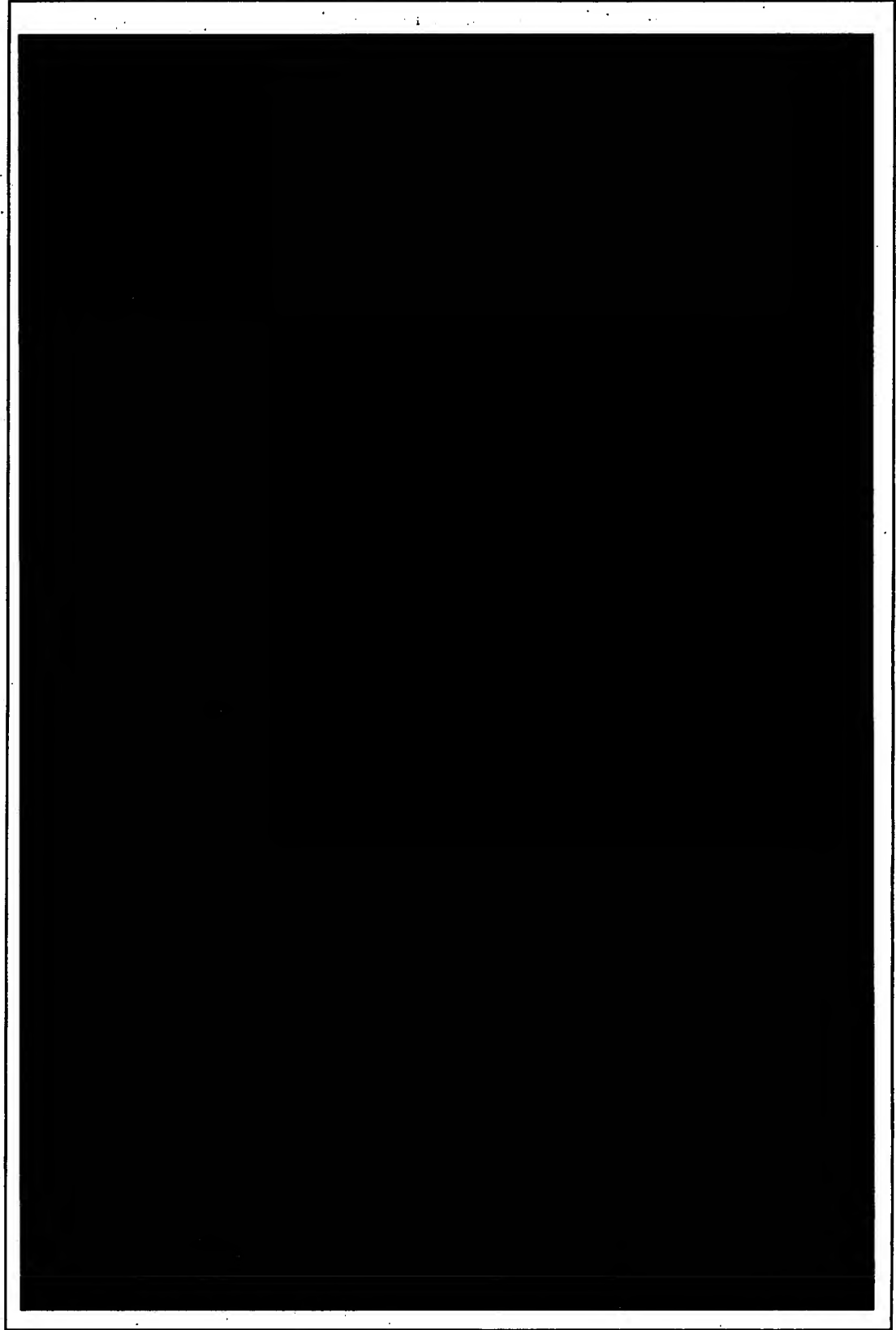
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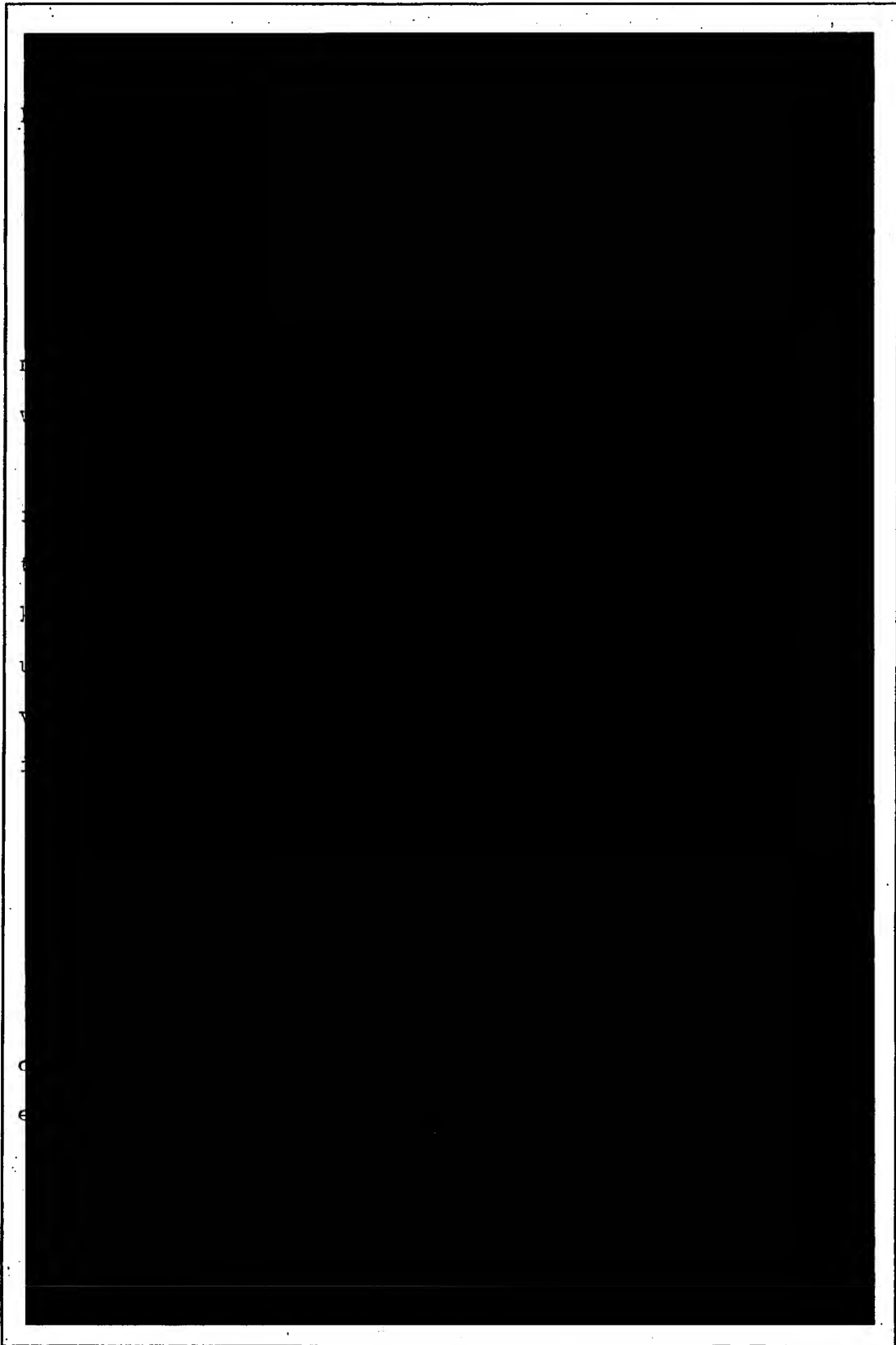
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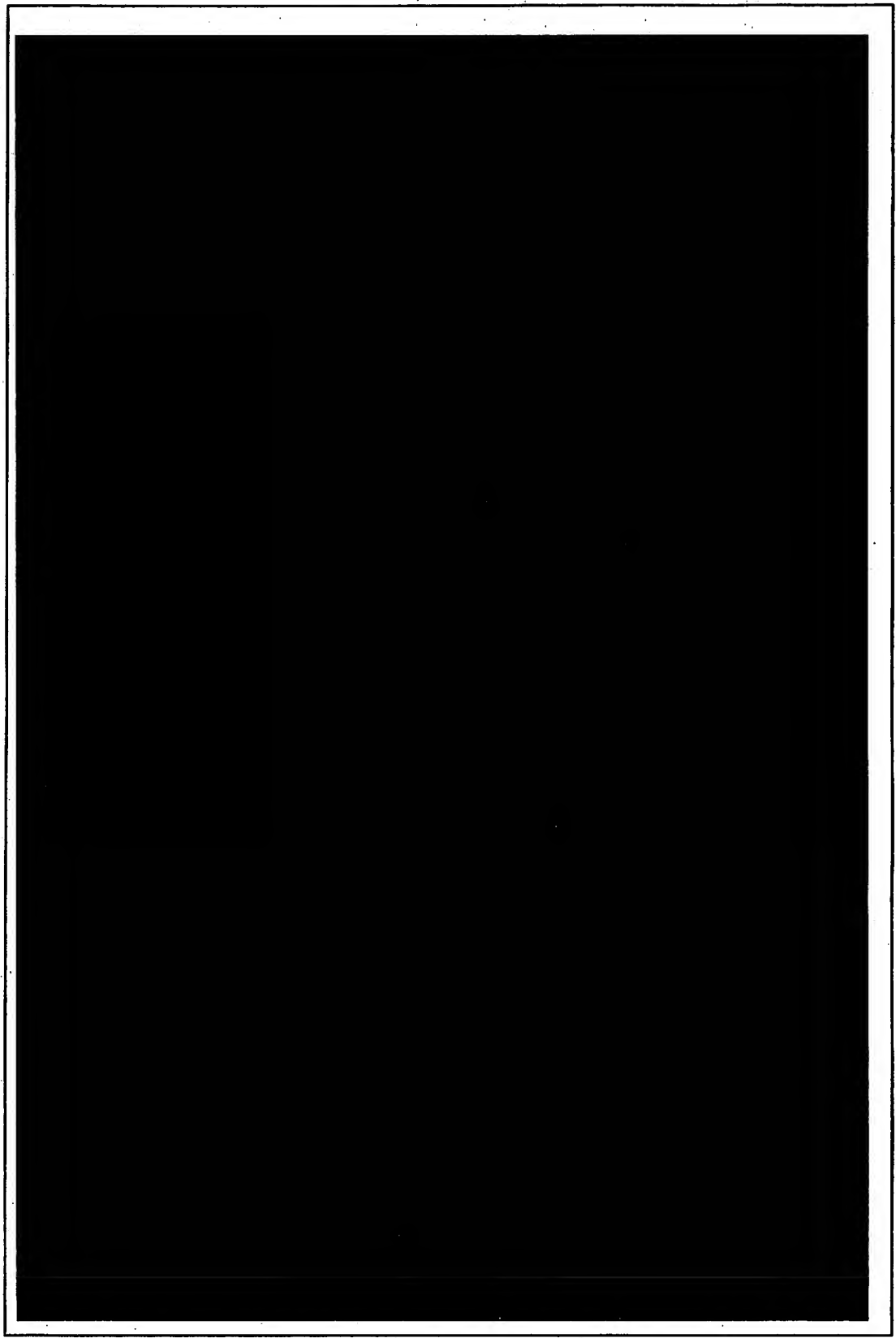
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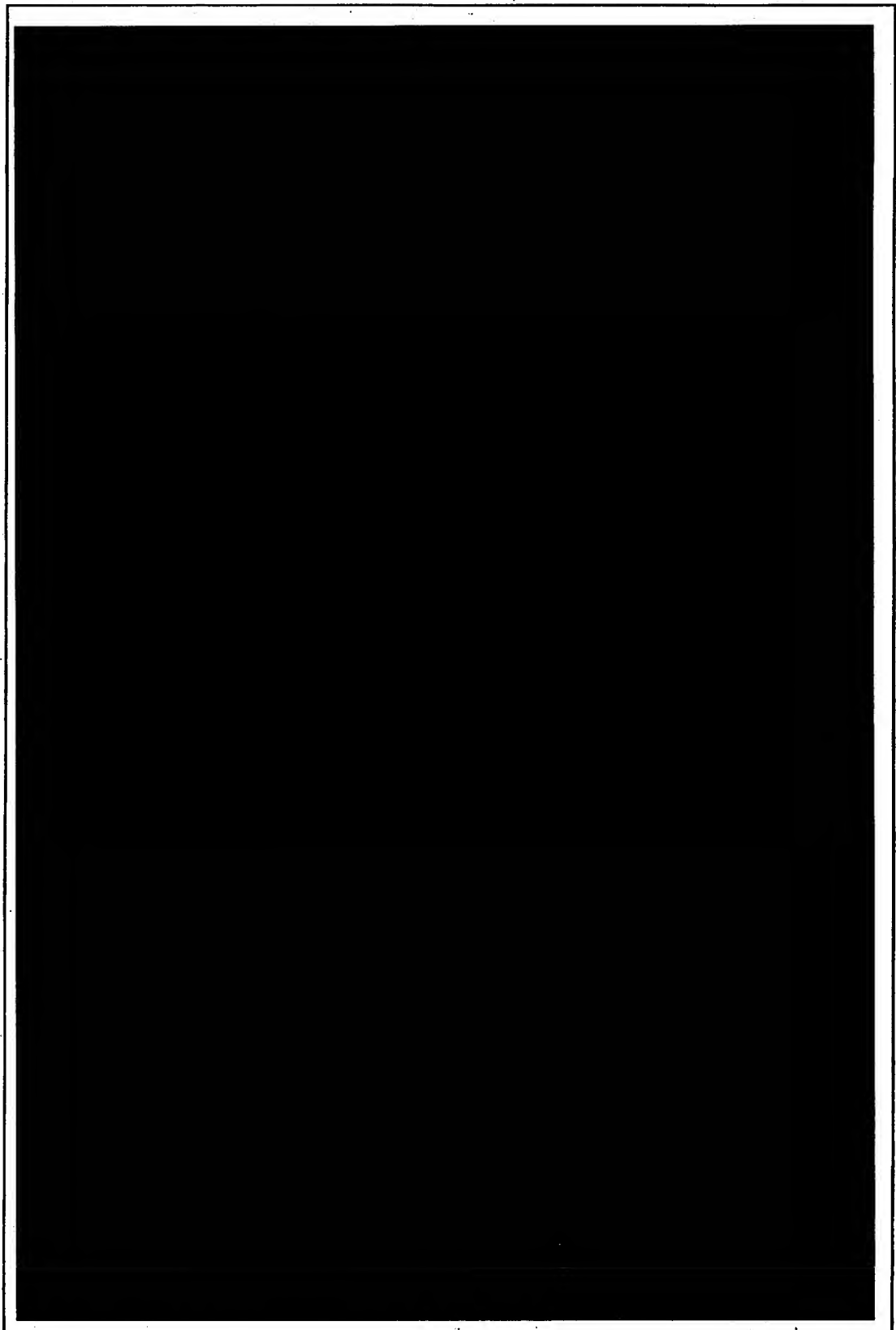
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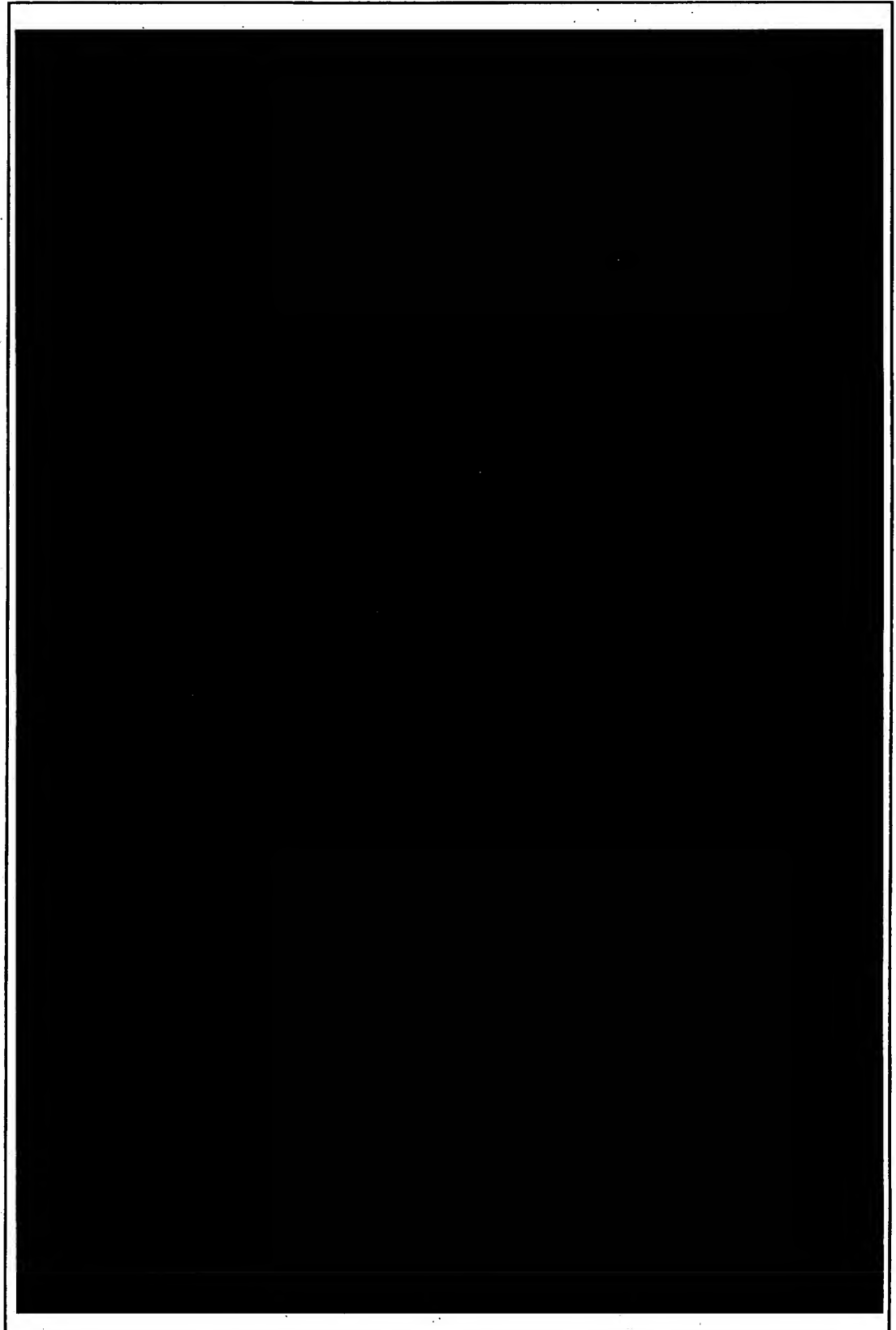


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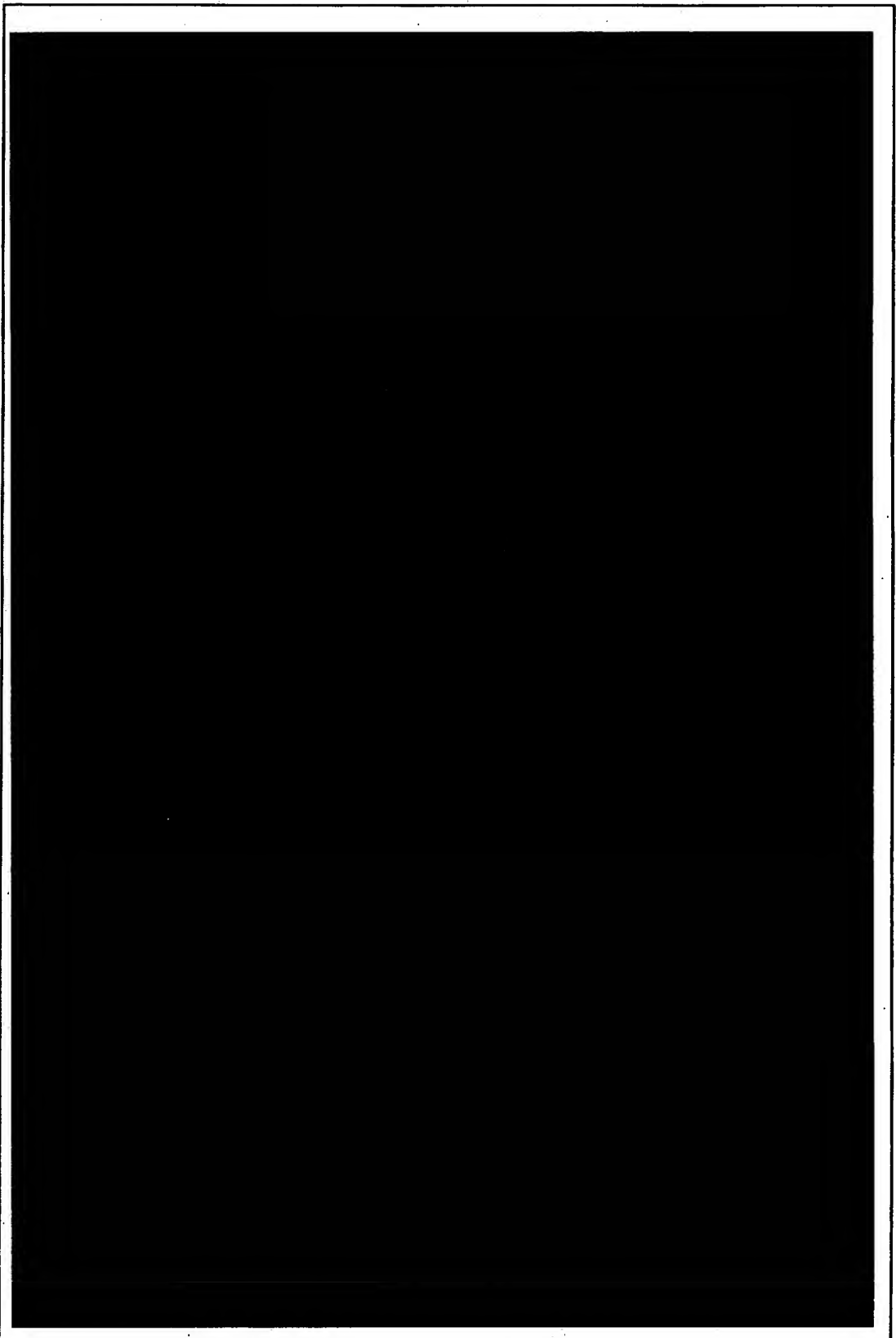




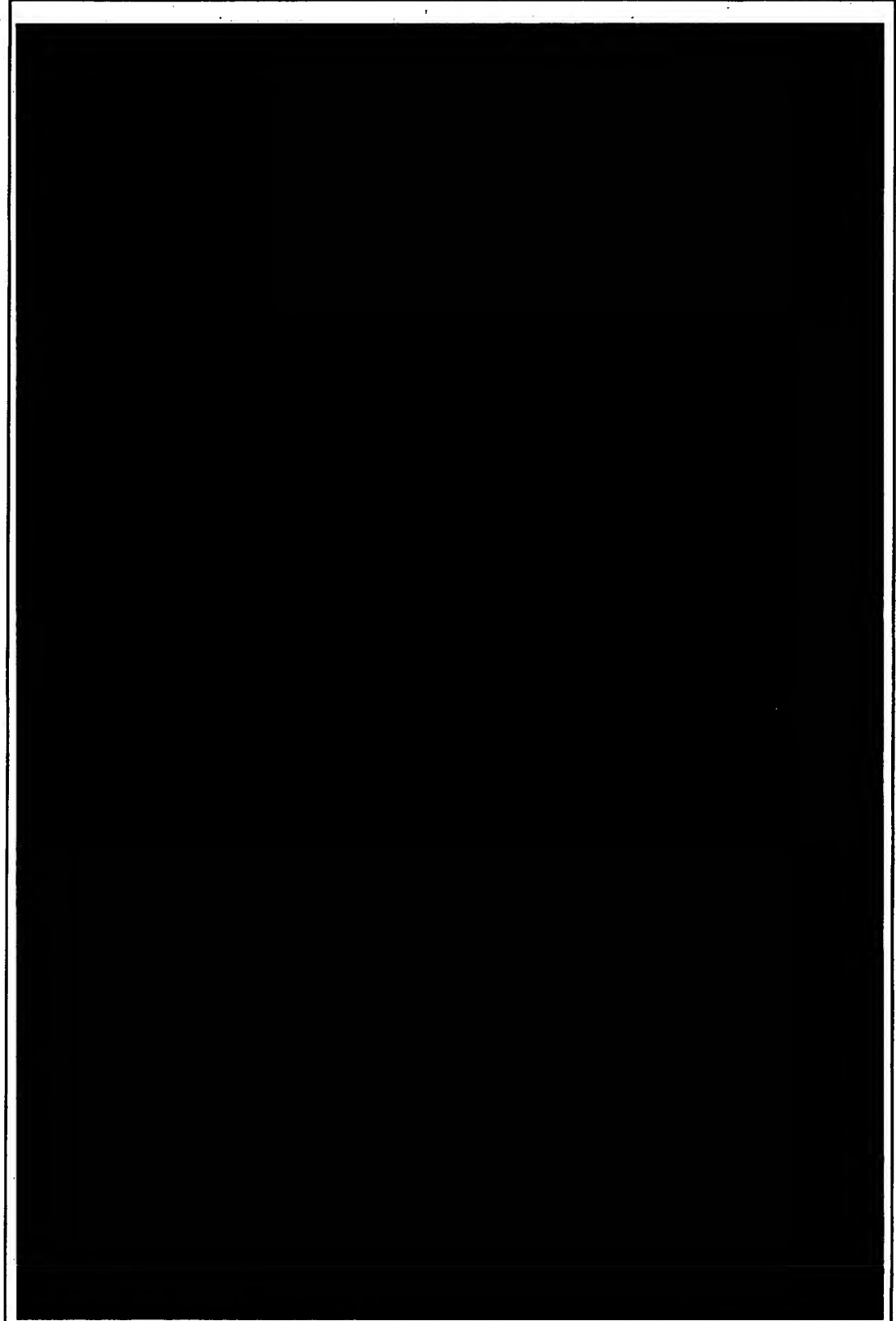
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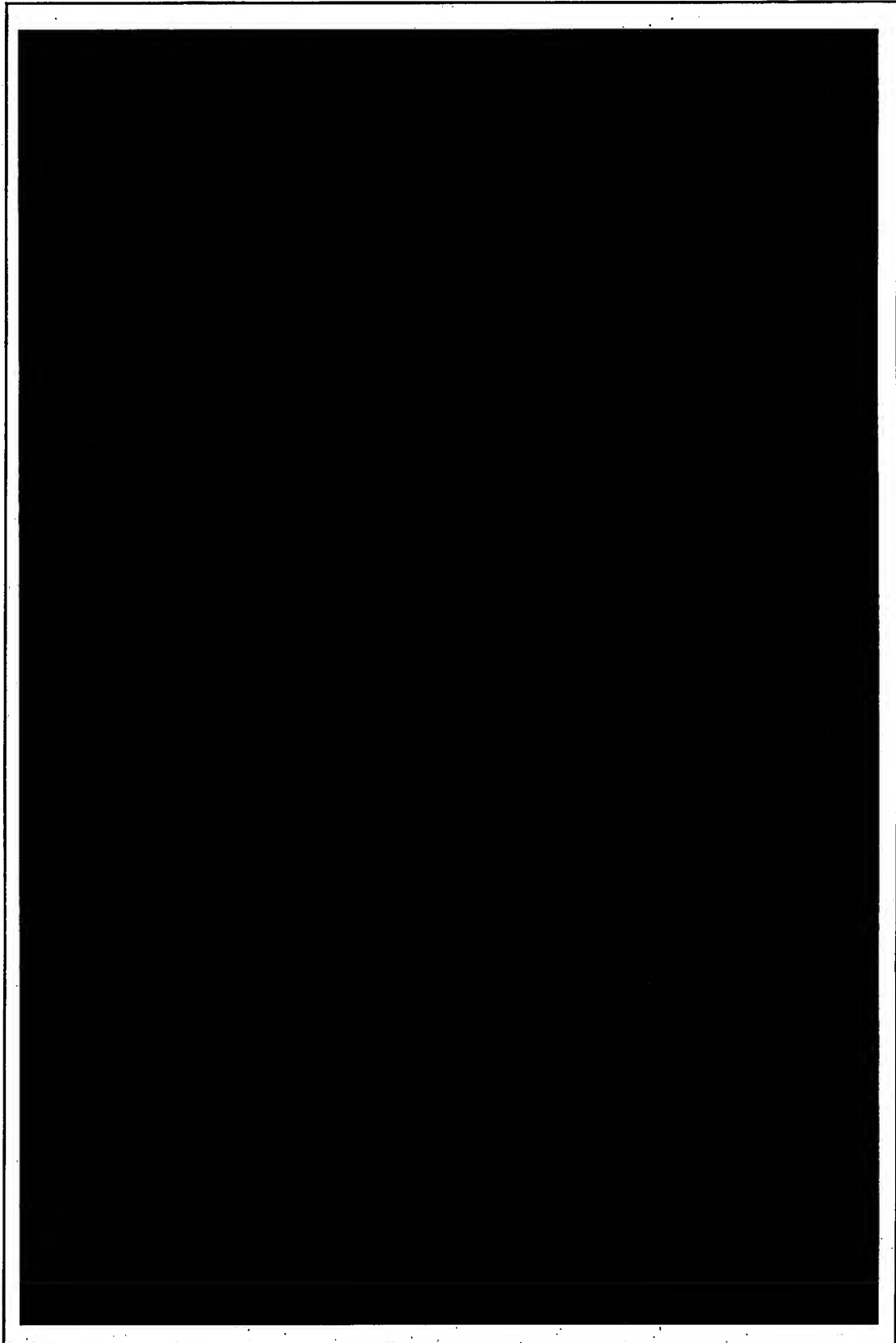
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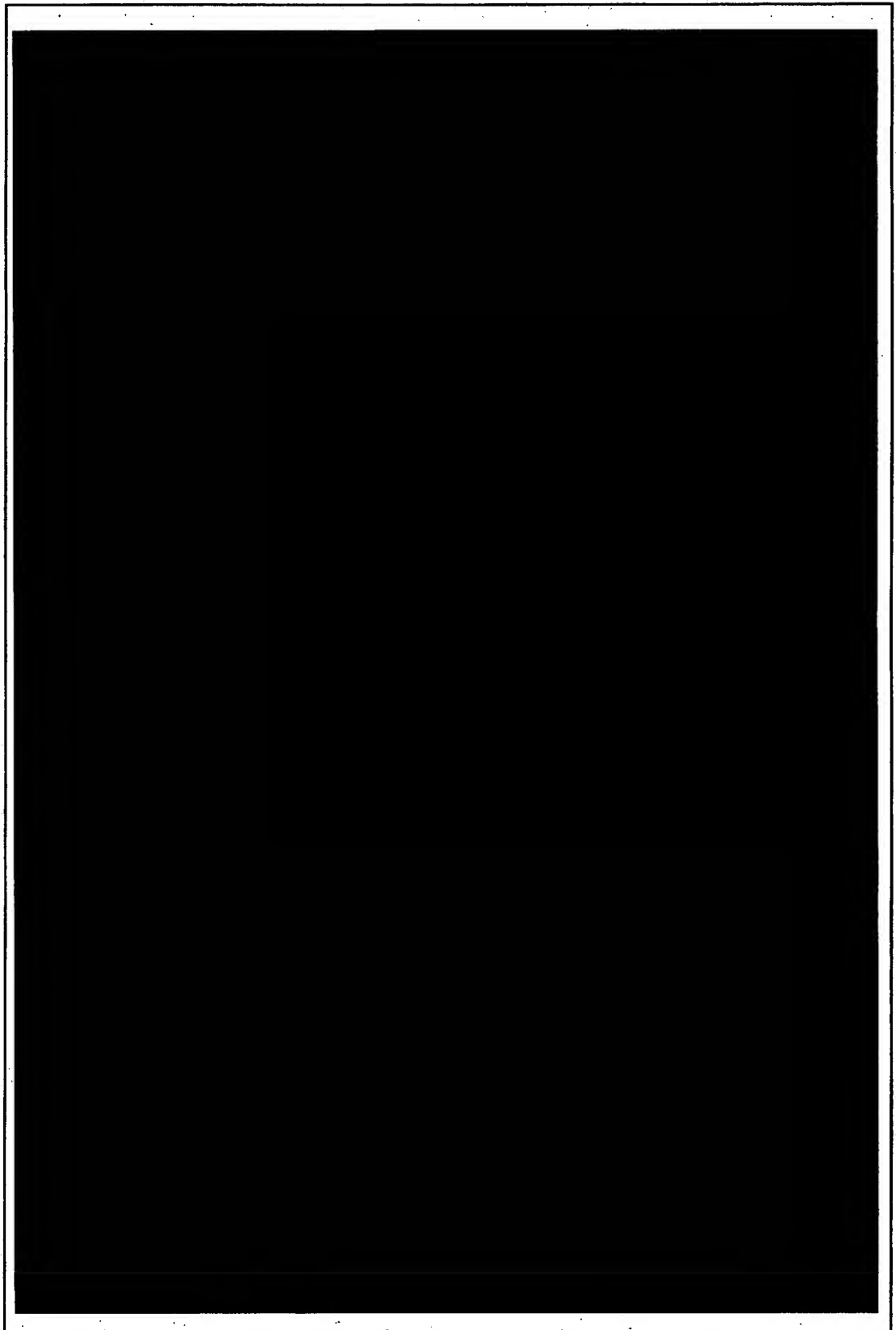
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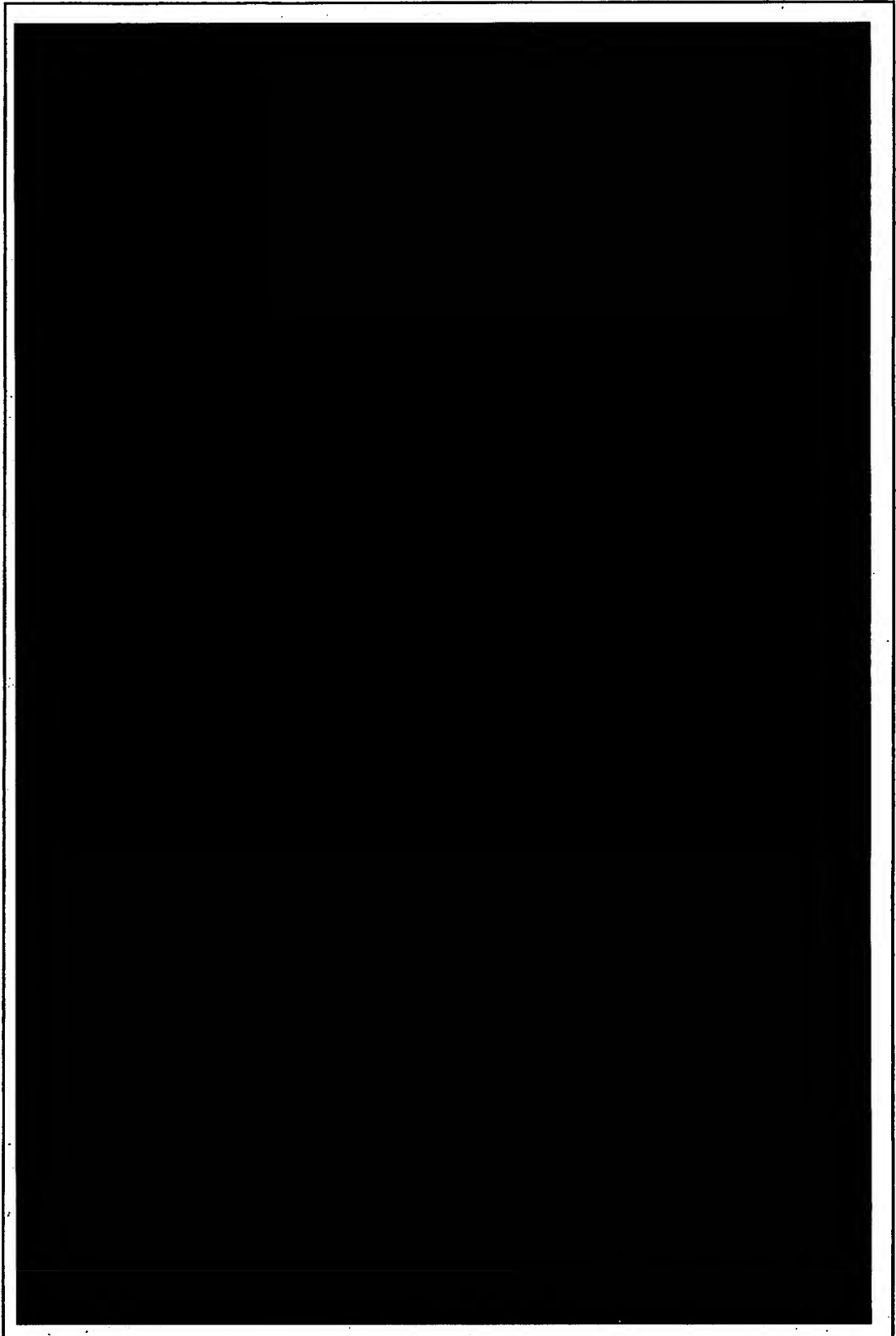
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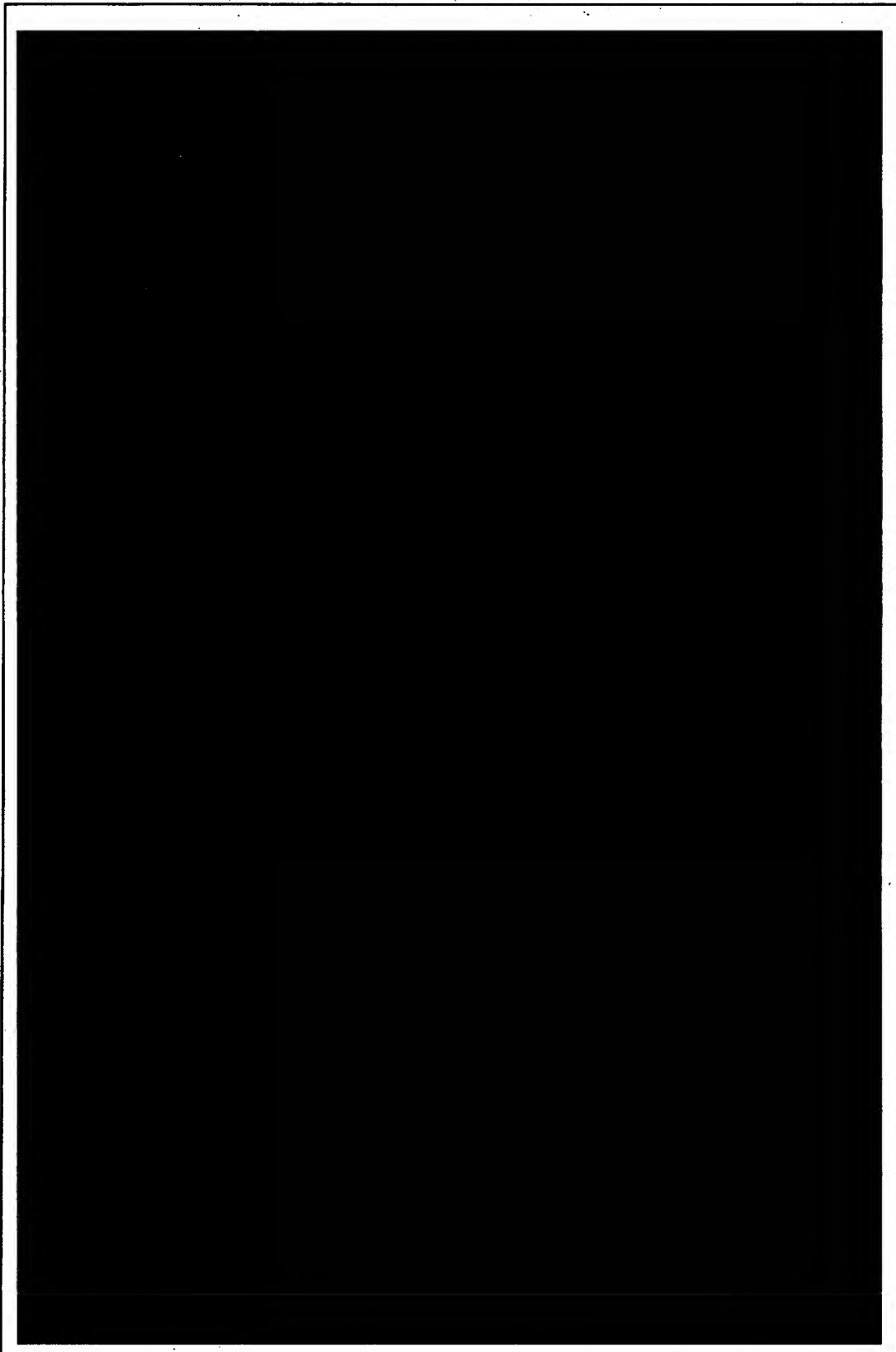
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BY MR. ROBINSON:

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A. That's okay.

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Q. I'd like you to tell me in as much lay language as you can use the difference between the technology that is described in the Mushovic patents and the, what I'll call, the Century-Board process. If I use those terms, do you --

Q. I'm trying to use terms that don't start a second argument about the terms we're using. But what I really want to start with is to try to get a list of the similarities and differences between what was in the Mushovic technology and the Century-Board technology.

MR. JULANDER: Objection. Asked and answered.

You can answer again.

THE WITNESS: I'm sorry?

MR. JULANDER: That's just an objection. It's been asked and answered. I think we've been through this, and we'll allow that just a little bit. It's their time. However they use it, they can.

THE WITNESS: The Mushovic technology revealed in the four patents, I believe, it's four ingredients have to be used for the technology to be in the patents. There's four elements that must be -- or isn't covered



1 by the patents, and that is a filler, unsaturated  
2 polyol, a saturated polyol, and isocyanate. I believe  
3 all four of those have to be used, and it can be foamed  
4 or unfoamed. That doesn't matter. That's the Mushovic  
5 technology.

6 What we changed to get the Century-Board  
7 technology, using your definition, is that we removed  
8 the unsaturated polyol, and that's the major difference.  
9 One of his ingredients is removed, and we just increased  
10 the saturated polyol to make up for it. There's  
11 actually a lot of work and things that go on besides  
12 that, but that's the basis of the difference in patents  
13 versus the Century-Board technology.

14 BY MR. ROBINSON:

15 Q. And you use the term polyol. When you use the  
16 term polyol, what are you referring to?

17 A. That's one of the two major ingredients to make  
18 polyurethane. When you make a polyurethane, you use a  
19 polyol and isocyanate very simply. There are other  
20 things that you can do, but simply those are the two  
21 basic components of a polyurethane.

22 Q. And the particular polyol -- well, let me  
23 ask -- you used the term saturated and unsaturated.

24 A. Yes.

25 Q. And what's the difference between an

1     unsaturated polyol and a saturated polyol?

2         A.     The unsaturated polyol requires another set of  
3     chemistries to make it cure, and that generally is  
4     polyester technology involving styrene.

5         Q.     All right. Do the Mushovic patents rely on use  
6     of the polyesters?

7         A.     Exclusively, you mean?

8         Q.     Yes.

9         A.     Well, yes. To make the unsaturated polyol cure  
10    properly I mentioned you use styrene. Well, the styrene  
11    is involved in the polyester chemistry, but there's two  
12    kinds of polyesters in this technology. There could be  
13    a polyester polyol, which is back in the saturated  
14    category, and then there's polyester polymers that are  
15    monomers that could be used on the unsaturated part of  
16    the Mushovic polyols.

17        Q.     Well, I think my question was whether the  
18    Mushovic technology required the use of polyester  
19    polyols.

20        A.     Polyester polyols. I'm not sure. I'm not  
21    sure.

22        Q.     And I've seen reference to polyester polyols  
23    and polyether polyols.

24        A.     Yes.

25        Q.     And those are two distinct categories of

1 polyols?

2 A. Yes.

3 Q. Well-known in the chemical business?

4 A. Yes.

5 Q. And what are the differences between them?

6 A. In our system, Century-Board system, they  
7 perform almost the same function. They work very  
8 similarly, but there are some attributes of each. The  
9 polyethers tend to be more stable, long term, and the  
10 polyesters are not, but there's a reason people would  
11 then chose polyester because it tends to be cheaper.

12 Q. So, functionally they are the equivalence?

13 A. They react exactly the same functionally.

14 Q. The end product from a polyester is different  
15 than the end product from a polyether?

16 A. They would tend to perform about the same  
17 initially. There are slight differences in strength and  
18 hardness, but generally they look about the same. If  
19 you pick the same kinds of sizes of polyether and  
20 polyester polyols, they would perform about the same.  
21 It's only when you get into long term exposures that you  
22 start to see differences.

23 Q. And what are the differences in long term  
24 exposures?

25 A. The polyester polyols tend to hydrolyze with

1 moisture and heat. They tend to fall apart quicker than  
2 the polyether polyols, but they are cheaper, so people  
3 use them.

4 Q. I may want to come back to this in a little  
5 more detail later, but for the moment the next area I  
6 need some explanation on is the process by which when  
7 you were doing your work on these in this area, you  
8 migrated from use of the Mushovic patents to development  
9 of the Century-Board process. I may have not  
10 characterized it the way you would, but I'm trying to  
11 understand where you started and where you ended up and  
12 the steps you went through to get there.

13 So, let's start with -- when I say, "you," I'm  
14 using the collective you. I mean, you personally,  
15 Ecomat, and Century-Board. Is that okay?

16 A. That's fine.

17 Q. Using the term that way.

18 A. That's fine.

19 Q. All right. When did you obtain the rights to  
20 the Mushovic patents?

21 MR. JULANDER: Objection. Asked and answered.

22 BY MR. ROBINSON:

23 Q. It's just an objection for the record.

24 A. Oh, okay. I believe around 1993ish.

25 / / /

1 Q. And did you attempt at that time to  
2 commercialize, to make commercial products using the  
3 Mushovic patents?  
4 A. Yes.  
5 Q. And did you actually sell products made with  
6 the Mushovic patents?  
7 MR. JULANDER: Objection. Asked and answered.  
8 THE WITNESS: Yes.  
9 BY MR. ROBINSON:  
10 Q. All right. And at some point in time you began  
11 to develop the Century-Board process, correct?  
12 A. Correct.  
13 Q. And when was that?  
14 MR. JULANDER: Objection. Asked and answered.  
15 THE WITNESS: Late '90s.  
16 BY MR. ROBINSON:  
17 Q. Can you be any more specific?  
18 A. I answered before, but it's a rough number.  
19 1998, possibly.  
20 Q. And we would look at your lab books and your  
21 Ecomat or Century-Board reports to fix the date of that?  
22 A. Yes.  
23 Q. Is there any particular report or reports we  
24 should be looking at?  
25 A. No. It would probably have to be in the lab

1 books when the first non-Mushovic resins arrived. I  
2 don't think we wrote reports about it because we didn't  
3 know it was going to work, so we didn't do a lot of  
4 reports.

5 Q. And what was the reason why you began to  
6 experiment with non-Mushovic resins?

7 MR. JULANDER: Objection. Asked and answered.

8 THE WITNESS: The first reason, which I'm not  
9 sure I mentioned earlier, is that the price of that  
10 unsaturated polyol was rapidly increasing. It's not a  
11 very big field. There aren't many people buying that  
12 stuff, so the price was going up rapidly. We knew it  
13 was becoming a problem on cost. The other reasons were  
14 that we had to work with styrene, which is an  
15 unpleasant, somewhat unsafe -- can be unsafe product to  
16 work with.

17 BY MR. ROBINSON:

18 Q. Any other reasons?

19 MR. JULANDER: Objection. Asked and answered.

20 THE WITNESS: It's a lot ingredients and a lot  
21 of blending that you have to do with that system, the  
22 Mushovic system.

23 BY MR. ROBINSON:

24 Q. So, you basically started to look for something  
25 that was simpler and cheaper?

1 A. Yes.

2 Q. Now, along the way, you used some chemicals  
3 from a company called Hehr? That's a yes?

4 A. Yes.

5 Q. And this was in connection with the  
6 exploitation of the Mushovic patents or the development  
7 of the Century-Board process or both?

8 A. I'm not remembering this totally. I believe  
9 Hehr may have had both materials, but they're certainly  
10 one of the first companies to supply the new  
11 Century-Board system.

12 Q. And you say both materials. What are you  
13 referring to?

14 A. I mean they supplied both the unsaturated  
15 polyol and the saturated polyol systems.

16 Q. Do you know whether the Hehr compounds were  
17 polyether compounds or polyester compounds?

18 A. Well, Hehr provided us with a lot of different  
19 compounds. Some might have been polyester polyols if  
20 that's what you mean, but both of them were polyether  
21 polyols -- or the both that we used were polyether  
22 polyols.

23 Q. And at some point in time did you switch from  
24 using chemicals provided by Hehr to chemicals provided  
25 by a company called Bayer?

1 A. Yes.

2 Q. When was that?

3 A. Late '90s. I don't remember the dates. There

4 were other companies, too. It wasn't just those two.

5 Q. What other companies?

6 A. There were, I believe, dozens of suppliers of

7 those materials that we evaluated, which are in the

8 reports.

9 Q. And what reports are you referring to?

10 A. To the Century-Board and Ecomat laboratory

11 reports.

12 Q. That's distinguished from your lab books?

13 A. Yes.

14 Q. Okay. And at the time you were speaking with

15 Mr. Taylor and Mr. Butteriss when you were still in New

16 York, was it the Hehr chemicals you were using or the

17 Bayer chemicals?

18 A. I don't recall.

19 Q. Did you at some point change from primarily

20 relying on Hehr chemicals to primarily relying on Bayer

21 chemicals?

22 A. Yes.

23 Q. Can you recall when that was?

24 A. No.

25 Q. Do you know why?



1 A. Do I know why?

2 Q. Right.

3 A. Cost of raw materials.

4 Q. Any other reasons?

5 A. Yes. We had some defective materials shipped

6 by Hehr. They had supplies with defective, wrongly

7 mixed ingredients, and we couldn't keep doing that, so

8 that's another reason we stopped using them.

9 Q. And from that point on you were primarily

10 relying on the chemicals from Bayer, correct?

11 A. That's correct.

12 Q. I have briefly looked at the Ecomat lab

13 reports, and I don't claim to understand even a little

14 bit of it, but I do see some references in those reports

15 to --

16 A. I'm sorry. Reports or lab books?

17 Q. I haven't seen any of your lab looks.

18 A. Okay. I'm sorry. Reports is what you're

19 taking about.

20 Q. Ecomat reports. I may have said laboratory

21 reports. And just for your reference, there's a

22 number -- or four numbers like 00 then a hyphen and then

23 a number.

24 A. Yes.

25 Q. And I take it that in those reports the first

1 set of numbers represents the year?

2 A. Yes.

3 Q. And the second two numbers represent the serial  
4 number in that year?

5 A. Correct.

6 Q. All right. And there are general references to  
7 Ecomat process or Century-Board process, but it isn't  
8 entirely clear to me what is meant by those terms, when  
9 you use the phrase Ecomat process or Century-Board  
10 process in one of those reports. So, can you tell me  
11 what the process is that you were referring to?

12 A. Is this used a lot, or you saw it once?

13 Q. I saw it on a number of occasions. Reports of  
14 testing using our process.

15 A. It is referring to the whole technology that's  
16 used to make those to do the work in the report, so if,  
17 for example, the report refers Ecomat process and we're  
18 using styrenic or unsaturated polyols, it would be  
19 referring to the Mushovic system. If it's using the  
20 saturated polyol system, then it would be referring to  
21 that whole process. It's not meant to describe Mushovic  
22 versus other patents. That's not the objective of that  
23 term. It means a high-filled polyurethane system  
24 overall.

25 Q. Okay. During the time prior to your coming to

1 Century Products, you used a number of methods of mixing  
2 the chemicals, correct?

3 A. Correct.

4 Q. And one method was a batch method when you  
5 would apparently mix in a container using some kind of  
6 drill, correct?

7 A. That's correct.

8 Q. And in other instances you would match mix in  
9 an extruder, correct?

10 A. That's correct.

11 Q. All right. With respect to the experiments you  
12 ran using an extruder, how did you make the product once  
13 the material had been mixed in the extruder. Did you  
14 use a mold box, some kind of conveyor system?

15 A. We certainly used mold box mostly. We did have  
16 a conveyor system we used to develop or decided that  
17 would work, but it was not obviously the system you see  
18 today in Anaheim.

19 Q. Where was the conveyor system?

20 A. What do you mean where was it?

21 Q. Was it located in a plant someplace?

22 A. No. No. It was right in our facility.

23 Q. In New York?

24 A. Yes.

25 Q. All right. And who designed that system?

1 A. I did.

2 Q. And what did it look like?

3 A. It was a continuous belted conveyor with rubber  
4 mold belts on top of it.

5 Q. And I think you may have answered this  
6 previously. You never made any commercial product using  
7 that conveyor system; is that correct?

8 A. That's correct.

9 Q. In the Ecomat reports are there any reports of  
10 tests of the mechanical qualities of the product  
11 produced using the conveyor system?

12 A. There's two conveyor systems. One is the one I  
13 justed talk about, a homemade quickie version, and then  
14 there was a another conveyor system we used at Coperion,  
15 so I'm not sure which one you're talking about. Now I  
16 forget.

17 Q. Well, let's do both of them.

18 MR. ROBINSON: Why don't you reread the  
19 question.

20 (The record was read)

21 BY MR. ROBINSON:

22 Q. And what tests would those be? What reports  
23 would those be?

24 A. One of the later reports on Coperion's  
25 extrusions where we used this belted conveyor system,

1 and the products of that were tested.

2 BY MR. ROBINSON:

3 Q. And what were they tested for?

4 A. Certainly flexural strength and flexural  
5 stiffness, probably hardness, and maybe some other  
6 things I don't remember.

7 Q. Density?

8 A. Certainly density.

9 Q. Okay. And do you recall any of those results?

10 A. I recall they were very good. I don't remember  
11 the data.

12 Q. And the tests that you ran at Coperion were  
13 using what kind of filler?

14 A. We used fly ash and ground glass separately.

15 Q. And was there any difference in the mechanical  
16 properties of the fly ash as opposed to the ground  
17 glass?

18 A. Yes.

19 Q. What was the difference?

20 A. Ground glass was far better.

21 Q. And how about testing of mechanical properties  
22 of product made on your homemade conveyor system?

23 A. I don't recall whether we even tested some of  
24 that because the purpose was to develop the process, not  
25 to develop product. We knew the product worked, so I

1 don't know. They may be in the reports. I don't know.

2 Q. With respect to the product that you made using  
3 the extruder and the conveyor system, were those --

4 A. At Coperion?

5 Q. In any testing using a conveyor system.  
6 What chemicals were used? Were those based on  
7 chemicals described in the Mushovic patents or the  
8 chemicals that are described in what we've been  
9 referring to as the Century-Board process?

10 A. Century-Board process.

11 Q. Did you run any tests at any time using an  
12 extruder and a conveyor forming system using the  
13 chemicals described in the Mushovic patents?

14 A. I don't recall, but it could have been when we  
15 were developing the homemade conveyor system that we did  
16 use the Mushovic materials as well. Both. I don't  
17 recall, though. I'm not sure.

18 Q. How would that be recorded if it was?

19 A. It would be in the lab books.

20 Q. The lab books?

21 A. The lab books.

22 Q. As opposed to the Ecomat reports?

23 A. Yes.

24 Q. What sort of pigment was used at Anaheim?

25 A. Was or is?

1 Q. Well, while you were there.

2 MR. JULANDER: It's vague as to time.

3 BY MR. ROBINSON:

4 Q. I said was, but during the time you were there.

5 A. It was on an outside pigment from a supplier in  
6 Canada.

7 Q. Called who?

8 A. Interstar.

9 Q. Was there any testing of Interstar pigment  
10 prior to Century Products?

11 A. By Century-Board?

12 Q. Right.

13 A. No.

14 Q. What sort of pigments did you -- and I use the  
15 word sort because I'm not that conversive with the  
16 technical aspects of it. But what sort of pigments did  
17 you experiment with when you were at Century-Board?

18 A. We used the same type of pigment which was iron  
19 oxide pigments derived from cement-type pigments as well  
20 as the ones for plastics and other materials as well as  
21 other kinds of organic and inorganic pigments. We used  
22 a broad range of pigments.

23 Q. Made by whom?

24 A. Probably 15 different companies.

25 Q. Why is it that when you went to Anaheim, you

1 obtained your pigments from a different source than what  
2 you had used at Century-Board?

3 A. Because the final pigment we had chosen in New  
4 York was from Bayer, and the Canadians had the exact  
5 same specifications on their pigments, and they were  
6 about half the price.

7 Q. What was the particle size of the pigments that  
8 you experimented with at Century-Board?

9 MR. JULANDER: Objection. Vague and ambiguous.

10 THE WITNESS: Answer?

11 MR. JULANDER: If you understand it. The term  
12 particle size is ambiguous in my mind. If it's not in  
13 yours, answer the question.

14 THE WITNESS: Well, it's actually more  
15 complicated than that, but I think I know what you mean.

16 BY MR. ROBINSON:

17 Q. Okay. Well, help me out.

18 A. The objective of Century-Board and Ecomat in  
19 New York was really R and D. We did an awful lot of R  
20 and D, and we looked at all kinds of pigments, and we  
21 looked at various particle sizes for the very purpose of  
22 coming up with what's the best pigment for the system.

23 The particle size that we ended up with worked  
24 the best for weathering, long term use, etc. and had a  
25 reasonable cost for the Bayer concrete or cement



1 pigments. Does that answer the question? Now I've lost  
2 the question.

3 Q. I was asking you about particle size.

4 A. And the particle size, I don't recall the  
5 numbers, but it was -- by saying it was cement pigments  
6 or concrete pigments, that defines the particle size.  
7 There's a range that they use for concrete that they  
8 don't use in plastics, so that sort of tells you the  
9 particle sizes. That's the difference in the pigments.

10 Q. And were any of these pigments glomerated?

11 A. Yes.

12 Q. What does the term glomerated mean to you?

13 A. That they are clumped up into pellets or balls  
14 or something.

15 Q. And were most of the pigments that you  
16 experienced with in New York glomerated pigments?

17 A. No. No.

18 Q. How many were?

19 A. It was very rare to use glomerated pigments.

20 Q. Was there some decision you made concerning the  
21 benefits of glomerated versus non-glomerated pigments?

22 A. There's really only one benefit in using  
23 glomerated pigments, and that is less dust. And since  
24 we were doing a lot of hand mixing, as you've described,  
25 non-dusty pigments were a benefit, so glomerated

1 pigments actually had more benefit, but not all pigments  
2 are glomerated, so we just stuck to the easiest form  
3 which is the non-glomerated. Another difference is if  
4 you start using plastic pigments, pigments used for  
5 coatings, pigments used for paint, they sometimes have  
6 binders in them to help hold the stuff in a glomerated  
7 form. We didn't want those chemicals, so that's why we  
8 tended to use the pure form which is non-glomerated.

9 Q. Okay. At Century Products you used what form?

10 A. We used both powdered and glomerated of the  
11 same pigment, but we switched to the glomerated because  
12 it was less dusty.

13 Q. Any other reasons?

14 A. It does theoretically feed better through the  
15 pigment equipment, feeding equipment. I'm not sure that  
16 turned out to be true, but that's what they advertised.

17 Q. Prior to Century Products, was there any  
18 testing of the effect of pigment on the strength of a  
19 product? I think you stated earlier that higher pigment  
20 levels improve scatch resistance, correct?

21 A. That's correct.

22 Q. So, we don't need to recall that field. Other  
23 than the scratch resistance aspects in terms of flexural  
24 strength, was there any experimentation regarding the  
25 effect of pigment on the strength of the product except

1 for scratch resistance?

2 A. Yes. There's quite a bit of work on  
3 weatherability.

4 Q. And where would that work be reflected?

5 A. Some is in the lab reports, but most of it of  
6 the real long term aging data would be in separate  
7 reports that were done for clients. Generally when we  
8 did work for outside clients, that was written as a  
9 separate report and probably wouldn't be in our report  
10 system.

11 Q. Okay. So, I would not have been given those  
12 reports, then? They would not be in the Ecomat reports?

13 A. That's correct.

14 Q. All right. Before I leave this, any other  
15 testing --

16 A. Effective pigments?

17 Q. -- on effective pigments on product strength?  
18 We talked about scratch resistance and weathering.  
19 Anything else?

20 A. Well, there is another effect, but -- I better  
21 say it, I guess. Since our system is highly filled  
22 we're putting as much filler, pigment, solid glass,  
23 solid things in our liquid, resin system that as you get  
24 way up in the solids, there's not a lot of room to play  
25 around with like adding more solids. For example, if

1 you're using two percent pigment, and you got a very  
2 filled system, you can't go adding eight percent pigment  
3 because it won't work. There's too much filler in  
4 total. Does that make sense?

5 Q. I think so.

6 A. In that case you'd say, "Well, if you keep  
7 adding more pigment to see the effect of the pigment on  
8 scratch and some other use, you can run into trouble  
9 with mechanical properties because you got too much dry  
10 stuff in the system. It's not the pigment per se, it's  
11 just too much stuff." So, I don't know if you mean that  
12 or not. I don't think you mean that, but I'll mention  
13 it.

14 Q. Well, what you're telling me is if you put too  
15 much pigment, it may actually weaken the product?

16 A. Yes. Or too much of anything that's dry. It  
17 will weaken the product.

18 Q. And I suppose this is generally true of the  
19 entire process, that is, a successful result is highly  
20 dependent on a proper combination of the correct  
21 substances and the right proportions, correct?

22 A. Which leads you to the Tagucci method, yes,  
23 but's that's another subject.

24 Q. I don't want to get too cute here. I'm just  
25 trying to understand what you did to get where you ended

1 up. Prior to Century Products, was there any testing of  
2 product, fading, or color change because of exposure to  
3 sunlight?

4 A. Of course.

5 Q. All right. And tell me what you did in that  
6 area. First of all, did you test both the Mushovic type  
7 product and the non-Mushovic type product, or were you  
8 mostly focused from that point on with non-Mushovic type  
9 product?

10 A. Well, in New York we did both, and when we were  
11 using mostly the Mushovic system, we did outdoor  
12 testing, weathering, UV testing with the Mushovic, and  
13 then we switched over. As we switched over to the newer  
14 system, we would test that one outdoors, and we did lots  
15 of testing on weathering and fading and whatever you  
16 call it. Light exposure.

17 Q. And where would those results be recorded?

18 A. Much of that is in the lab reports you have, in  
19 lab books, and then the separate reports for clients.

20 Q. Do you have copies of the separate reports for  
21 clients?

22 A. Some we have, yes.

23 Q. All right. First of all, with respect to the  
24 Mushovic patents what did you find with respect to the  
25 effects of exposure to sunlight?

1       A.     Very dependent on the formulation. It could be  
2 absolutely wonderful results; no fading, no color  
3 change, no strength loss, or it could be terrible  
4 depending on how you mix the formulation.

5       Q.     And with respect to the non-Mushovic  
6 technology, what did you find about the effects of  
7 sunlight?

8       A.     Same thing. You can have wonderful outdoor  
9 resistance, and you can have terrible outdoor resistance  
10 depending on the formulation.

11      Q.     Okay. Well, what formulations had wonderful  
12 outdoor resistance?

13           MR. JULANDER: Objection. Vague and ambiguous.

14           THE WITNESS: Well, there's hundreds of them.  
15 Hundreds of good ones and probably hundreds of bad ones.  
16 It isn't one formulation. There's hundreds of  
17 formulations that work well.

18 BY MR. ROBINSON:

19      Q.     And that's reflected in the Ecomat reports you  
20 gave us?

21      A.     Yes.

22      Q.     I take it from your prior statement that you  
23 don't think there was any advantage between the Mushovic  
24 and non-Mushovic compounds with respect to resistance to  
25 sunlight?

1       A.    No.  I didn't see any difference.  The best  
2       were the best.  Both.

3       Q.    All right.  Are there any records of tests of  
4       mechanical properties of the product that was made in a  
5       box mold as compared to product--same compound--made  
6       using the extruder conveyor method?

7       A.    Yes.

8       Q.    It's kind of an awkward question.  You  
9       understand what I'm asking?

10      A.    I understand, yes.

11      Q.    And were such tests comparisons made?

12      A.    Yes.

13      Q.    And where would the results be found?

14      A.    This was done at Century Products.

15      Q.    Prior to Century Products?

16      A.    That's just the one I quoted you.  If you're  
17      talking about -- are you talking about Century-Board?

18      Q.    Yeah.  I'm sorry.  I didn't make it clear.  My  
19      questions are now focusing on the time prior to Century  
20      Products, and I meant that with respect to all these  
21      questions.  If I didn't make it clear, I'm sorry.  And  
22      the same would be true with the fading and all that kind  
23      of stuff.  My question is:  tests made prior to your  
24      coming to Century Products.

25           MR. JULANDER:  Did you understand his questions

1 that way?

2 THE WITNESS: No, I didn't. Well, that last  
3 question I got wrong, I think.

4 BY MR. ROBINSON:

5 Q. So, you didn't compare fading in sunlight in  
6 Century-Board, and those would be reflected in the  
7 reports you gave me?

8 A. I didn't answer yet. You're talking about  
9 extrusion plus conveyor versus box mold?

10 Q. Right.

11 A. That was done at Century-Board and is in the  
12 lab reports.

13 Q. Was there any testing at Century Products of  
14 fire resistance?

15 A. Century-Board.

16 Q. I'm sorry. Century-Board. Now, I'm doing it.

17 MR. JULANDER: Why don't you ask that one  
18 again.

19 BY MR. ROBINSON:

20 Q. Testing at Century-Board of fire resistance,  
21 was there any?

22 A. Yes.

23 Q. And where would that be recorded?

24 A. It would be in the lab reports and in these  
25 independent client reports.



1 Q. All right. Is any testing of coating or  
2 painting, the results of coating or painting of the  
3 product at Century Products?

4 A. Yes.

5 Q. And where would those be reflected?

6 A. Lab reports, lab books, and probably not in the  
7 separate reports.

8 Q. Was there any testing while at Century-Board to  
9 the correlation between strength and ash content?

10 A. Absolutely.

11 Q. And where would these reports be reflected?

12 A. In the lab reports.

13 Q. Is there any data from your time at  
14 Century-Board related to the effect of pressure during  
15 processing on the strength of the material?

16 A. During forming you mean?

17 Q. Right.

18 A. There was work done on box molds to show the  
19 effect of pressure, and that should be in the lab books,  
20 yes. I don't think it was in the reports, no.

21 Q. So, do you know what the pressure was when the  
22 product was forming in a mold box at Century-Board?

23 A. I don't think we know what the pressure is  
24 exactly, no.

25 Q. It was never measured at that time?

1       A.     In the tests we did, we didn't measure the  
2 actual pressure.

3       Q.     What sort of tests did you do?

4       A.     We did tests to affect the various pressure  
5 levels in the mold, but we didn't measure it. We'd  
6 close off the mold more or less to see that more and  
7 more material would flow out which affected the  
8 pressure. We didn't measure the pressure itself.

9       Q.     When you were at Century-Board and were using  
10 the conveyor belts to form the product, did you ever  
11 test the pressure that was applied by the conveyor  
12 belts?

13      A.     No.

14      Q.     During the time at Century-Board, was there any  
15 testing of the effects of water soaking on the product  
16 that you produced?

17      A.     Absolutely.

18      Q.     And did you test both the Mushovic and the  
19 non-Mushovic compounds?

20      A.     I'm not absolutely positive about the Mushovic  
21 compounds. We certainly tested the Century-Board  
22 products.

23      Q.     And did you test absorption?

24      A.     Yes.

25      Q.     Did you test loss of strength?

1       A.     I'm not sure if we actually tested loss of  
2 strength. We measured loss of hardness, loss of weight,  
3 gain of weight, but I'm not sure if we actually measured  
4 the flexural strength, I assume you're referring to.  
5 I'm not sure we did that.

6       Q.     And where would those test results be recorded?

7       A.     Lab books and lab reports.

8       Q.     All right. I have seen references in these  
9 materials, and I think, maybe, you even mentioned it in  
10 your testimony at some point to rigid polyols and rubber  
11 polyols.

12      A.     Yes.

13      Q.     And what are those terms referred to?

14      A.     It essentially refers to the amount of  
15 molecules or amount of segments or molecules between the  
16 reactive groups on these polyols. Let's just say for  
17 simplicity there's a reactive group at the end of each  
18 polyol like spaghetti. The length of what's in the  
19 middle makes it rubbery or rigid. That's very  
20 generalized, but --

21      Q.     It's a good starting point.

22      A.     Okay.

23      Q.     Let me back up a second. Why are some polyols  
24 referred to as rubbery polyols and other polyols are  
25 referred to as rigid polyols?

1       A.     It has to do with the length of that stuff in  
2     the middle of the spaghetti. That's what that's  
3     referring to. Not 100 percent, but that's a basic,  
4     simple way of looking at it.

5       Q.     Between the reactive groups?

6       A.     Yes.

7       Q.     All right. When you say something is rubbery,  
8     I take it that it means it's pliable? When you say  
9     something is rigid, it's not pliable?

10      A.     That's correct.

11      Q.     I guess my question was more toward what are  
12     the implications of using a rubbery polyol as opposed to  
13     using a rigid polyol as opposed to just a strict  
14     chemical difference. My question was not very artful,  
15     but that's what I'm trying to get at.

16           MR. JULANDER: Do you understand that?

17           THE WITNESS: Not exactly. But you already  
18     said there's a difference between the two; one is  
19     rubbery, and one is rigid. I explained it chemically,  
20     but I don't know what else you want me to say about  
21     that.

22      BY MR. ROBINSON:

23      Q.     Well, what's the effect of using a rubbery  
24     polyol as opposed to using a rigid polyol?

25           MR. JULANDER: The process.

1 THE WITNESS: On the product?

2 BY MR. ROBINSON:

3 Q. Right, on the product. I mean, there's a  
4 purpose for using both, I assume, or one or the other,  
5 and that's what I'm looking for.

6 A. If you use the rigid polyol alone, you would  
7 end up with something extremely brittle, extremely  
8 stiff, maybe like a piece of glass, window glass. That  
9 would be a rigid polyol. If you used a rubbery polyol,  
10 you would end up with something like a rubberband, and  
11 the rubberband material would be very good on impact.  
12 It might be better on water resistance, and that's it..  
13 The rigid one might absorb more water. It might be  
14 better on outdoor weathering. So, there's differences.  
15 You want a product that you can handle that doesn't  
16 break, stiff. It depends what you want in the product,  
17 but you usually combine the two to get what you want, or  
18 you find one polyol that has exactly the properties that  
19 you want or three or four, but you balance the polyol to  
20 give you the rigidity, stiffness, rubberiness that you  
21 want in your product.

22 Q. When you were at Century-Board, did you use one  
23 polyol that had both characteristics, or did you use two  
24 separate polyols?

25 A. We used four, maybe, five. We used various.

1 combinations.

2 Q. To get the right balance of rubbery and rigid?

3 A. Yes.

4 Q. All right. And when you were at Century  
5 Products, what did you do to get the proper balance  
6 between rubbery and rigid polyols?

7 A. We used two polyols generally. We used one and  
8 two. Mostly two at Century Products.

9 Q. And those were both from Bayer?

10 A. No. We used from other sources, too, but  
11 mostly from Bayer.

12 Q. Is there a relationship between whether a  
13 polyol is rigid and rubbery in its molecular weight?

14 A. Generally, yes.

15 Q. And generally what's the relationship?

16 A. The higher the molecular weight, the more  
17 rubbery it would tend to be.

18 Q. I've seen reference to a term called  
19 functionality?

20 A. Yes.

21 Q. Does that have some significance to you?

22 A. Yes.

23 Q. And what does functionality refer to?

24 A. That refers to the two ends of the spaghetti  
25 and whether it reacts with isocyanate or not. So, for

1 example, the spaghetti I was talking about had a  
2 functionality of two because it had a reactive group on  
3 each end.

4 Q. All right. And is there a relationship between  
5 functionality and rigidity and flexibility?

6 A. Yes.

7 Q. And what's that relationship?

8 A. This is not getting so simple.

9 Q. Well, I appreciate you bearing with me, but  
10 I've seen these terms in various places, and I just want  
11 to make sure that I understand what you mean when you  
12 use them.

13 MR. JULANDER: And you're still asking for an  
14 expression that a lay person could understand? I mean,  
15 for example, spaghetti I doubt is a highly technical  
16 term for that.

17 THE WITNESS: It works.

18 BY MR. ROBINSON:

19 Q. Well, we're trying to understand it, and so as  
20 simple as you can make it the better, and I realize it  
21 could get very complicated, but we're not qualified --

22 A. Well, when I explain it, I don't want to  
23 exclude things. I got to exclude things to make it a  
24 simple story. For example, as the functionality goes up  
25 and the molecular weight doesn't, you tend to get more

1 and more rigid.

2 Q. So, in general, the increasing functionality is  
3 associated with more rigidity, correct?

4 A. Generally, yes.

5 Q. And less functionality would be associated with  
6 being more rubbery?

7 A. That's correct.

8 Q. Molecular weight works -- I won't say the  
9 opposite. That's probably a too simplified thing, but  
10 generally as a molecular weight increases you get more  
11 rubbery, and as it decreases you get more rigidity,  
12 correct?

13 A. That's correct.

14 Q. There's some other terms here, and I just want  
15 to go through them real quick, and then we'll take our  
16 lunch and recess if that's okay with you. I'm just  
17 trying to get some of the vocabulary straight because I  
18 do have some questions I want to ask, but if I don't  
19 understand it the way he understands it, we'll never get  
20 the questions answered. All right.

21 Then there's a thing called isocyanate.

22 A. Yes.

23 Q. Correct me if I'm wrong. I'll just say it my  
24 way. Two polyols will not react together.

25 A. That's correct.



1 Q. But if you add either one polyol or two polyols  
2 or more polyols will isocyanate, you will get a  
3 reaction?

4 A. That's correct.

5 Q. That concept is really at the heart of the  
6 technology we're talking about, correct?

7 A. That's correct.

8 Q. When you were at Century Products, was there  
9 just -- I don't mean different brands of isocyanates,  
10 but in the process is it just one isocyanate used or  
11 more than one isocyanate used to cause the reaction  
12 between the polyols?

13 MR. JULANDER: Objection. Vague and ambiguous.

14 THE WITNESS: There's generally one isocyanate  
15 that's used at a time. That's what I meant. Generally.  
16 But the isocyanate itself is not usually one isocyanate.  
17 The isocyanate you buy are a blend of isocyanates.

18 BY MR. ROBINSON:

19 Q. I see. But it comes preblended from the  
20 manufacturer?

21 A. That's correct.

22 Q. So, it will have a manufacturer's name and a  
23 number, and that's that brand, but it may be a mixture  
24 of isocyanate?

25 A. That's correct.

1 Q. All right. When you were at Century-Board,  
2 before you got to Century Products, did you use one  
3 isocyanate? And when I say, "one isocyanate," I mean an  
4 isocyanate that might have been a blend at the time.

5 A. No.

6 Q. So, you used multiple blends at a time at  
7 Century-Board?

8 A. You mean two different blends together in one  
9 formulation?

10 Q. Right.

11 A. Yes, we used more than one isocyanate in a  
12 blend rarely, but we did.

13 Q. And what effect did that have?

14 A. I don't know how to answer that. I mean, is  
15 there a benefit?

16 Q. I'm just asking what effect it had. I don't  
17 know the answer to the question. That's why I'm asking.  
18 Let's just assume that all isocyanates are a blend for  
19 the moment.

20 A. They are.

21 Q. All brands of isocyanates are a blend.

22 Now, you said on occasion at Century-Board you  
23 used more than one blend of isocyanate, correct?

24 A. That's correct.

25 Q. And I'm just interested in generally what

1 effect that did or did not have on the product.

2 A. I don't recall any general response. It would  
3 depend very much on the mixture. We obviously did not  
4 want to use two different isocyanates. We wanted to use  
5 as few as possible, so we always tried to get back to  
6 one, but I don't recall what the benefit might have been  
7 in two.

8 Q. At Century Products did you use one blend of  
9 isocyanates at a time?

10 A. Yes.

11 Q. Did you experiment with different blends of  
12 isocyanates?

13 A. Yes.

14 Q. And were the blends of isocyanates that you  
15 used at Century Products the same ones that you used  
16 before when you were at Century-Board?

17 A. Mostly, but there were some new suppliers we  
18 used that we did not use at Century-Board.

19 Q. All right. And why is it that you used  
20 different suppliers at Century Products than you did at  
21 Century-Board?

22 A. Location in the U.S. and generally when you buy  
23 other ingredients like polyols from one company, they  
24 insist that you buy their isocyanates as well. They  
25 sell packages. So, when we tried new polyols from a new

1 company, you generally use their isocyanate as well.

2 Q. I've seen reference to another compound, and it  
3 looks a little the same. I think it's different, and  
4 it's called isocyanurate?

5 A. Isocyanurate.

6 Q. It's i-s-o-c-y-a-n-u-r-a-t-e.

7 A. Yes.

8 Q. What is that?

9 A. That's another kind of polymer that is formed  
10 sometimes when you mix the same ingredients as you mixed  
11 to get polyurethanes.

12 Q. And the same ingredients being what? Two  
13 polyols plus an isocyanate?

14 A. Plus the other ingredients. Water.

15 Q. And what role do the isocyanurates play in the  
16 Century-Board process?

17 A. Well, they're usually present because of the  
18 way we mix our ingredients. We don't really follow them  
19 chemically. We don't actually analyze to find them. We  
20 know they're there, and we just make the product work.  
21 We don't really focus on their presence.

22 Q. But they do have some function with respect to  
23 the mechanical properties of the end product?

24 A. If there's enough of them, yes.

25 Q. And what effect would they have?

1 MR. JULANDER: Objection. Vague and ambiguous.

2 THE WITNESS: It means a whole range of  
3 polymers you're talking about, but generally in the  
4 system we're using, they're very rigid materials, and  
5 some of the other forms -- well, he didn't ask about  
6 other forms.

7 BY MR. ROBINSON:

8 Q. Well, I'm trying to figure out why you would be  
9 concerned about having the isocyanurates in as part of  
10 the process. What difference does it make?

11 A. Well, it's a different kind of polymer. It has  
12 different properties than polyurethane, so it is  
13 something that you have to know that's there because it  
14 can cause benefits or problems. But it's usually very  
15 small percentages of the polyurethane, so we really  
16 don't focus on them. It's like a side reaction. But  
17 you can get in trouble if you don't realize you've got  
18 some of that in the formulation.

19 Q. Okay. But having an isocyanurate is not  
20 central to the Century-Board process; am I correct?

21 MR. JULANDER: Objection. Vague and ambiguous.

22 THE WITNESS: Say that again.

23 BY MR. ROBINSON:

24 Q. I'm trying to understand the significance, if  
25 any, that the isocyanurates have to the Century-Board

1 process. You've explained it's a side reaction and can  
2 get you in trouble if it's there, and you don't know  
3 that it's there, but it sounds to me like it's a  
4 byproduct and something that's not really critical to  
5 the end product you're aiming for.

6 A. It generally isn't, but it depends on the  
7 actual formulation you make. You can produce quite a  
8 bit of it and start to run into problems. It can be a  
9 problem, but normally we -- since it is a byproduct, a  
10 side reaction product, it isn't something you normally  
11 focus on.

12 Q. Was it ever a problem at Century Products?

13 A. I don't know how to answer that because we  
14 never analyzed for that particular polymer. We never  
15 analyzed a polymer to find which is urethane, which is  
16 isocyanurate.

17 Q. Okay. And there are a few other terms here.  
18 Surfactant, what does that refer to?

19 A. Can't Shutov answer all this?

20 MR. TREMBLAY: He's not suing us. If he was,  
21 he'd be answering, too.

22 THE WITNESS: I'm defining chemical names.

23 MR. JULANDER: It's okay. It's a fair  
24 question.

25 THE WITNESS: Surfactant, to make it simple

1 it's a detergent wetting agent.

2 BY MR. ROBINSON:

3 Q. And it's functioned in the Century-Board  
4 process?

5 A. It has many functions. It helps the isocyanate  
6 and the polyols blend together. It helps control the  
7 particle size of the bubbles. It helps the liquids in  
8 the system wet the filler and fiber. That should be  
9 enough. There's other little -- that's the main  
10 functions.

11 Q. As I understand it, the main benefit of the  
12 Century-Board process is it allows you to substitute  
13 fillers such as fly ash which takes the place that would  
14 otherwise be taken up by polyurethanes?

15 A. Correct.

16 Q. And thereby allows you to make a product that  
17 is less dense; is that correct?

18 A. Not necessarily less dense. The main benefit  
19 you mentioned, which is less polymer.

20 Q. At least less expensive?

21 A. Less expensive.

22 Q. But there has to be some way -- and, again,  
23 pardon my inartful expression. There has to be some way  
24 of getting the filler, the ash to bind with the  
25 chemicals, correct? If not, tell me.

1       A.     Well, you don't necessarily have to have the  
2 filler bind with the other ingredients, but it certainly  
3 is far better in our system if it does, and that's what  
4 I mentioned. The surfactant helps wet the filler.

5       Q.     All right. So, the filler goes where you want  
6 it to go and stays where you want it to stay inside the  
7 product?

8       A.     That's a bit of a stretch.

9       Q.     All right. You said it's a wetting agent.

10      A.     Yes.

11      Q.     So, let's go back with that, and, if you could,  
12 explain briefly how the surfactant as a wetting agent  
13 relates to the ash filler?

14      A.     Well, the wetting agent helps promote the  
15 wetting of the resins urethane ingredients onto the  
16 filler. It helps separate the filler particles so that  
17 they are able to be wetted by the resin. It does the  
18 same thing with the fibers. I don't know what else  
19 you -- is that enough?

20      Q.     Well, if that's all there is.

21      A.     Well, there's more, but it gets --

22      Q.     Well, give me a little bit more.

23             MR. JULANDER: Give him the whole answer.

24             THE WITNESS: It's gets very --

25             MR. JULANDER: If it gets more technical,



1 that's his problem. He can go to Shutov and get an  
2 interpretation. Just give him the whole answer.

3 THE WITNESS: The surfactant also controls the  
4 distribution and size and shape of the bubbles, and in  
5 the fill system that's very critical where the bubbles  
6 and the where the filler and where the fiber are, that  
7 arrangement of where they are or whether the filler is  
8 poking into the bubbles, whether the fiber runs through;  
9 all that is very critical, and the wetting agent helps  
10 control that. It affects it. And you have to find the  
11 right wetting agent that gives you what you want.

12 BY MR. ROBINSON:

13 Q. It sounds like the surfactant is a pretty  
14 important part of this process.

15 A. It's critical. Very critical.

16 Q. Critical both as to its chemical properties and  
17 to the percentage of surfactant it should have, correct?

18 A. Yes.

19 Q. Okay. And now I've seen reference to something  
20 called MDI.

21 A. Yes.

22 Q. And what is that?

23 A. That is an isocyanate, which we've discussed.

24 Q. Okay.

25 A. That is the one that is being used, I assume,

1 in Anaheim, the blend they're using.

2 Q. And was that used by Century-Board prior to  
3 Anaheim?

4 A. Yes.

5 Q. But that MDI isocyanate is a basic  
6 off-the-shelf item, correct?

7 A. It's not one thing. It's a blend, but MDI  
8 could be a hundred different blends, so there could be a  
9 hundred MDIs for sale.

10 Q. What does MDI stand for?

11 A. Methylene di-isocyanate.

12 Q. Okay. And so the methylene di-isocyanate could  
13 be any one of the number of blends that are available  
14 out there?

15 A. Yes.

16 Q. The letters MDI don't tell you anything other  
17 than the category of the compound?

18 A. Correct.

19 Q. And finally, I've seen reference to catalysts.

20 A. Yes.

21 Q. And what is the role of catalysts in the  
22 process?

23 A. The isocyanate and the polyols react together  
24 to give you polyurethane, as we've mentioned before. If  
25 you don't add catalysts, it could take hours or days for

1 the reaction to go between those ingredients and maybe  
2 never completes. The catalyst's role is to speed up the  
3 reactions, including the foaming reaction, bubbles, not  
4 just the polyurethane formulation.

5 Q. How many different kinds of catalysts are used  
6 in the process?

7 A. As many as you want, but, at least, two.

8 Q. And you used two catalysts while you were at  
9 Century-Board?

10 A. We used one, two, three, maybe four. Up to  
11 four different catalysts.

12 Q. Did you reach any conclusions prior to leaving  
13 Century-Board about the optimum combination of  
14 catalysts?

15 A. Yes.

16 Q. What was that conclusion?

17 A. It's really two conclusions because we did  
18 extrusion work which required much higher levels of  
19 catalysts, and we did the mold work, casting work which  
20 required a lot less catalysts, but generally we used a  
21 tin and an amine type of catalyst together to give us  
22 the best properties and weathering and long term  
23 properties, etc.

24 Q. All right. Let's take those one at a time.

25 A. Okay.

1 Q. Did you use the same kinds of catalysts at  
2 Century Products that you would use at Century-Board,  
3 that is, a tin and amine catalyst?

4 A. Yes.

5 Q. All right. What does the tin catalyst do?

6 A. We've actually already discussed this about  
7 inside out curing and all that kind of stuff.

8 Q. Well, I didn't quite follow you. That's why  
9 I'm asking again.

10 A. Let's see if I can remember which is which.  
11 One of the catalysts causes gelation which is reaction  
12 of the isocyanate and the polyol as well as catalyzed  
13 the reaction of water with isocyanate and causes foam.  
14 The other one generally causes only the reaction of the  
15 polyol and the isocyanate to give you a polymer. So,  
16 they do about the same things except one is more  
17 involved with the water reaction to give foaming.

18 Q. Which is which?

19 A. I'm not sure I remember. I'll have to look.

20 Q. Okay. So, both the tin catalyst and amine  
21 catalyst react with and speed the isocyanates/polyol  
22 reaction, correct?

23 A. Exactly.

24 Q. In addition, one of the others --

25 A. One of those.

1 Q. -- reacts with the water to cause the foaming?

2 A. It doesn't actually react with the water, but  
3 it causes the isocyanate to react faster with the water.

4 Q. Okay. And then you mentioned somewhere the  
5 inside out and outside in, and that's where I got a  
6 little confused. I'm going to have to ask you to  
7 restate that for me, and, maybe, I'll have some  
8 follow-up questions.

9 A. One of the catalysts, I believe, it's the tin  
10 catalyst, generally gives you more curing reaction on  
11 the outside of the product where there's air present,  
12 and the other catalyst, which is the amine generally  
13 works throughout the product regardless of the air.

14 Q. So, that would be the inside out, the amine?

15 A. Yes.

16 Q. And the tin would be the outside in because it  
17 also reacts with the air, correct?

18 A. Yes.

19 Q. Now, have I in our discussion this morning gone  
20 through all the chemicals that are used in the process?

21 A. No.

22 Q. Okay. What have I left out?

23 A. You've mentioned water, but you didn't focus on  
24 it as a separate ingredient. Water is quite critical  
25 obviously.

1 Q. Is water separately added?

2 A. Yes, separately added.

3 Q. Well, I saw somewhere reference to water  
4 content of ash, and I'm just wondering if the water  
5 comes in as part of the ash or whether it's actually  
6 added as a separate --

7 A. It's both. Any water anywhere reacts with  
8 isocyanate, so any water in the polyol, any water in the  
9 ash, any water in the surfactant, any water whatsoever  
10 even in the air will react to isocyanate, so you have to  
11 count all of it together.

12 Q. You have to get the right amount of water?

13 A. You sure do.

14 Q. If you get too much or too little, you can have  
15 a real problem?

16 A. Yes. It's very critical.

17 Q. And you say there's water in the ash, there may  
18 be water in the isocyanate, there may be water in the  
19 polyol. How do you figure out how much water the human  
20 needs to add to all these chemicals to make this thing  
21 stay in balance?

22 A. Well, the easy way is to put it all together  
23 without water and see what you get. That's the easy  
24 way.

25 Q. So, like the way I make pancakes, I guess?

1       A.     Yes. And if you want a little more water, you  
2     add it, but you can do it theoretically and dry each of  
3     the materials. Like the ash you can dry and see how  
4     much water there really was in it, or the specifications  
5     from the supplier may tell you how much water is in the  
6     polyol.

7       Q.     How did you handle that problem at  
8     Century-Board?

9       A.     We did it both ways. We did the theoretical  
10    because in the beginning we were trying to understand  
11    what it was that was causing the foaming. We wanted to  
12    know how much water was in the ash and whether or not it  
13    reacted or not because it could have been that the water  
14    held by the ash wasn't reactive, so we had to go through  
15    that originally. After we got quite comfortable with  
16    all that, we just did it the easy way, which was try it  
17    without water, see what you get, and then you can  
18    calculate how much water you need to get the density you  
19    want later on.

20    Q.     How did you do it at Century Products?

21    A.     Generally, we knew roughly the amount of water  
22    we needed, and we did it the trial and error way most of  
23    the time, which was we would see what we got without  
24    water and then add water and fix it. We did do some  
25    calculations using the water formula, which was attached

1 to the trade secret manual, and that calculation can be  
2 used to figure out how to get the right properties with  
3 water.

4 Q. I'm just trying to envision this. You'd make  
5 some product, see what the properties were, then say,  
6 "needs two ounces of water," and then the next run you'd  
7 add the water?

8 A. That's exactly what we do, yes.

9 Q. It wasn't done through a chemical analysis of  
10 the product?

11 A. You can. As I said, it's pretty simple to do  
12 if you know what the ingredients contain in water, which  
13 mostly we did. Most ingredients come with a water  
14 content. Isocyanate has none. But they tell you when  
15 they ship you the polyol how much water is in it, and  
16 you can look at that and say, "We already have enough  
17 water. We don't have to add any." You can do that, but  
18 generally it's just so simple to turn the machine on and  
19 see how much foaming you get--there will be always  
20 some--and say, "That's enough. Let's add X amount of  
21 water, and we'll get what we want."

22 Q. Are we talking about pints of water or gallons  
23 of water? How much water do you have?

24 A. It could usually be under one percent. A very  
25 small amount of water.



1 Q. All right. Any other chemicals?

2 A. Yes. There are other things we've tried.

3 There are delayed catalysts which are sometimes used.

4 Q. Are we using delayed catalysts in Century  
5 Products these days?

6 A. Yes.

7 Q. What's the difference?

8 A. Just slower. It's a catalyst, but it's slower  
9 or delayed, meaning it doesn't start when other ones  
10 would start. We used acid inhibitors, which also  
11 delayed the catalysts just as a delayed catalyst does.  
12 We used internal mold releases. I'm not sure of the  
13 category. Chemicals that caused better bonding between  
14 the ash and the polymer in addition to wetting agents or  
15 surfactants, and there's many other things we tried.

16 Q. You mean at Century-Board or at Century  
17 Products?

18 A. Mostly at Century-Board. At Century-Board we  
19 tried a lot more kinds of things. At Century Products  
20 we didn't because we were certain of where we were, we  
21 thought.

22 Q. All right. Anything else in terms of chemical  
23 compounds that we haven't talked about?

24 A. Well, there's mold release, but they're not in  
25 the formulation.

1 Q. Let's talk about mold release for a moment  
2 because I understand that that can be a major issue in  
3 this process.

4 A. It can be.

5 Q. Let's start with Century-Board, and then we'll  
6 move forward in time. At Century-Board what kind of  
7 mold release compounds did you experiment with?

8 A. We probably looked at over 50 different  
9 exterior mold releases and, maybe, 20 internal mold  
10 releases, so we looked at many of them to try and find  
11 what was the best. It's tough to find ones that work  
12 well.

13 Q. Now, when you say external mold release, you  
14 mean something that gets put on the belt itself so that  
15 it's external to the product?

16 A. Yes.

17 Q. And when you say, "internal," you're talking  
18 about something that's chemical that you actually mix  
19 into the chemical mix that becomes the product itself?

20 A. That's correct.

21 Q. All right. Before you left Century-Board, had  
22 you settled on a mold release?

23 A. No, not a mold release. We settled on several  
24 that worked very well, and it did depend on which type  
25 of belt you were using. We just didn't use one type of

1 belt or mold.

2 Q. All right. And there are some reports in --  
3 some data in the Ecomat reports concerning your  
4 experiment with mold releases at Century-Board?

5 A. I believe so, yes. Yes. I know there is.

6 Q. When you came to Century Products, did you have  
7 in mind a particular mold release that you planned to  
8 use?

9 A. I believe when we came to Century Products, we  
10 actually brought; at least, two mold releases with us,  
11 which we thought were among the best, yes.

12 Q. Did they work?

13 A. Yes.

14 Q. Was there any mold release difficulty at  
15 Century Products?

16 MR. JULANDER: Objection. Vague as to time.

17 THE WITNESS: We occasionally had sticking  
18 problems, but that wasn't related to the mold release.  
19 I don't think any mold release would have prevented  
20 this. When we made some really bad formulations, they  
21 would stick, but that was due to some really bad polymer  
22 being made, but the mold releases generally worked very  
23 well.

24 BY MR. ROBINSON:

25 Q. I'm not sure I understand what you mean when

1 you say it was generally due to some bad polymer being  
2 made. You mean bad product? When you say, "polymer," I  
3 don't know --

4 A. I'm sorry. Product.

5 Q. Bad product?

6 A. Bad product.

7 Q. And what was the problem with the product?

8 A. For example, if the product, the urethane was  
9 not completely reacted or not enough reacted so it was  
10 still very sticky and still reacting, it might go right  
11 through the mold release and attack the rubber on the  
12 belts. You normally don't want that to happen because  
13 that's a big disaster, but that did happen, and it  
14 happened back in New York as well if we weren't careful.  
15 We did a lot of new formulations in New York, so you ran  
16 into that more often.

17 Q. The belts that were used in California, were  
18 those manufactured at the Anaheim facility?

19 A. Yes.

20 Q. Okay.

21 MR. ROBINSON: Well, it's 12:05 or thereabouts,  
22 so let's take our lunch right now.

23 (Luncheon recess at 12:04 ending at 1:38 p.m.)

24 MR. ROBINSON: We marked as Exhibit 4 a typed  
25 document which relates to identification of certain

1 items from Exhibit 3.

2 (One-page document entitled Identify  
3 from Exhibit 3 the following, marked  
4 Claimant's Exhibit 4 for  
5 identification.)

6 Mr. Tremblay prepared this prior to the lunch  
7 recess, and we can follow up later on some of the  
8 questions that are on it. So, why don't we just give  
9 that to the reporter for the moment as Exhibit 4.

10 And then we'll mark as Exhibit 5 a series of  
11 documents.

12 (51-page document Bates stamped CB02034  
13 through CB02095, marked Claimant's  
14 Exhibit 5 for identification.)

15 This is a series of documents that are Bates  
16 stamped at the bottom, and the very first page is  
17 CB02034, and it continues on and ends with CB02095.

18 And I can tell you, Mr. Brown, these were  
19 documents that were produced in the discovery we've had  
20 today by your attorney, Mr. Julander.

21 MR. JULANDER: Can I just inquire one thing,  
22 Counsel? When you received these documents or these  
23 Bates stamped pages, they were not stapled. Someone  
24 from your office put these documents together?

25 MR. ROBINSON: That's correct.

1           MR. JULANDER: So, this may be more than one  
2 document?

3           MR. ROBINSON: It may be more than one  
4 document, but these documents, I think, fit together.  
5 You're right. They were all loose, but I went through  
6 and tried to put together the documents that I thought  
7 went together.

8           MR. JULANDER: Okay. I haven't checked it out,  
9 but are they consecutive?

10          MR. ROBINSON: They are consecutive except  
11 there are some pages in the middle -- let me just be  
12 clear. This particular group of documents deals with I,  
13 think, what we've been calling the materials patent.

14          Intermingled with these particular pages were  
15 some drawings that related to obviously something other  
16 than the materials patent, and I'll be asking about  
17 those, too. I segregated those because it seemed clear  
18 to me that a drawing of a conveyor belt isn't really  
19 part of the materials patent, but I will ask him about  
20 those. They are consecutively numbered, yes.

21          MR. JULANDER: Why don't we have two documents  
22 here?

23          MR. ROBINSON: Why you don't have two  
24 documents?

25          MR. JULANDER: Well, the gap is at CB02043, and

1 it goes to CB020454. Is there a reason why these aren't  
2 two distinct exhibits?

3 MR. ROBINSON: Only because I think all these  
4 pieces of paper go together. I think you'll see through  
5 the questioning that these are related.

6 MR. JULANDER: Okay. That's fine.

7 BY MR. ROBINSON:

8 Q. Okay. Mr. Brown, have you had a chance to leaf  
9 through this?

10 A. Yes.

11 Q. Do you recognize the pages that I've given you?

12 A. Yes.

13 Q. And can you generally describe what they are?

14 A. They are the U.S. patent application for the  
15 material patent filed by me.

16 Q. All right. And when was the materials patent  
17 application filed?

18 MR. JULANDER: Are you asking for his memory on  
19 that, or do you want him to leaf through it?

20 MR. ROBINSON: Yes, memory.

21 THE WITNESS: I'll just go by memory.

22 Sometime in 2003 we completed it and ready for  
23 filing with -- or at least, sending it to the patent  
24 attorney, but there were some huge delays by Ameren,  
25 which I don't know whether it got into the patent

1 attorney or not.

2 BY MR. ROBINSON:

3 Q. I'm sorry. I missed that last statement. You  
4 prepared an application --

5 A. We prepared an application.

6 Q. In 2003?

7 A. I believe in 2003. But Ameren said they wanted  
8 their patent attorneys to review it.

9 Q. Armstrong Tisdal?

10 A. Yes. They reviewed it, but for some reason  
11 there was a great delay, months of delay, and then we  
12 finally sent it to the patent attorney. So, what that  
13 final date was when the patent attorney sent it and when  
14 it was filed by the U.S. Patent Department, I don't  
15 remember the dates, but they're obviously right on that  
16 paper.

17 Q. Were you ever given an explanation for the  
18 delay?

19 A. Yes. It was just people were very busy and  
20 couldn't get to it. There was apparently no technical  
21 reason. We kept yelling, "Where is this patent  
22 application?" because it was part of milestones for  
23 Ameren. We had to get it done.

24 Q. And you said we kept asking? Who is the "we"?

25 A. I would ask John Taylor, and John Taylor would



1 call Ameren.

2 Q. Do you recall there being some question about  
3 what elements in the materials patent application  
4 represented technology that you had brought into Century  
5 Products as opposed to technology that had been  
6 developed at Century Products?

7 MR. JULANDER: Can you read that back, please.

8 (The record was read)

9 THE WITNESS: I remember early on there was a  
10 discussion of what this was supposed to cover because  
11 now we're talking not just about Century-Board filing a  
12 patent. We're talking about we had Armstrong Tisdal  
13 involved, Ameren involved, and Century Products. And I  
14 don't think it was a very long discussion. The brief  
15 discussion was, "We're going to make this totally on  
16 Century-Board prior to Century Products. It's going to  
17 be all Century-Board information."

18 BY MR. ROBINSON:

19 Q. Well, was a decision ever made that the  
20 technology described in the patent application draft  
21 that you sent to Century Ameren was entirely based on  
22 technology before you came to Century Products?

23 MR. JULANDER: Objection. It's vague and  
24 ambiguous.

25 THE WITNESS: Isn't that what I just said?

1 That the intent was all this information would be  
2 gathered from information prior to the formulation of  
3 Century Products.

4 BY MR. ROBINSON:

5 Q. I understand that's intent. Was a decision  
6 ever reached that, in fact, everything in this  
7 application related to technology that existed prior to  
8 your starting to work at Century Products?

9 MR. JULANDER: Objection. Vague and ambiguous.  
10 If you think you understand that question, I'd ask her  
11 to read it back.

12 THE WITNESS: Okay. Please read it back.

13 (The record was read)

14 BY MR. ROBINSON:

15 Q. A decision was reached?

16 A. Yes.

17 Q. And what was the decision that was reached?

18 A. The decision was this was to be a Century-Board  
19 derived patent without the inclusion of Century Products  
20 data.

21 Q. But you added the words, "to be." Is it your  
22 testimony that the patent application you submitted for  
23 review by Ameren's attorneys included only technology  
24 that existed prior to your starting to work at Century  
25 Products?

1       A.     No. I didn't say that. What I said was the  
2 patent application that went to the patent attorneys to  
3 be filed was only Century-Board derived technology.

4       Q.     And Ameren agreed with that?

5       A.     I don't know how quite to answer that.  
6 Certainly Ameren approved what we sent to our patent  
7 attorney.

8       Q.     So, let's turn to -- it's at the very end. It  
9 starts at Page 2068, and it goes through Page 2095. I'm  
10 leaving out the CB and the first 0.

11      A.     2068?

12      Q.     2068 through 2095. There's 28 pages there.

13      A.     Yes.

14      Q.     All right. And can you tell me what these 28  
15 pages are?

16      A.     These are the text of the patent.

17      Q.     This is the patent application?

18      A.     Patent application, yes.

19      Q.     That you authorized your attorney to send to  
20 the patent office, correct?

21      A.     That's correct.

22      Q.     And is it your testimony that Ameren approved  
23 the sending to the patent office of this application in  
24 the form that we have before us now?

25      A.     I don't recall whether there was a specific

1 approval by Ameren, but the fact that we did send it to  
2 Kilpatrick Stockton after Armstrong Tisdal reviewed it  
3 and may have made some comments, and it was finally put  
4 off for a milestone, and Ameren was satisfied, I assume  
5 they had to approve it.

6 Q. But you don't have any documentation, for  
7 example, a letter from Armstrong Tisdal saying, "Dear so  
8 and so, you, and Mr. Gray, we've reviewed the draft  
9 patent application you sent to us. We agree that it's  
10 entirely Century-Board technology, and we approve the  
11 filing of the patent application," or something to that  
12 effect. You don't have any documentation of that,  
13 correct?

14 A. I don't know that. I might indeed have some  
15 documents. They wouldn't have been in -- well, I  
16 shouldn't say that. I might have documents like that.  
17 I don't know. I don't know what came back from  
18 Armstrong Tisdal.

19 Q. All right. Well, then, I'm going to ask that  
20 you look for any documentation that you might have that  
21 would indicate that Armstrong Tisdal as patent counsel,  
22 and I think at the time they were working jointly for  
23 Ameren ran Century Products.

24 MR. JULANDER: Ask him the question if he's  
25 ever seen a letter from directly from Armstrong and

1 Tisdal.

2 BY MR. ROBINSON:

3 Q. Was it your understanding at this point in time  
4 that Armstrong Tisdal was jointly representing Ameren  
5 and Century Products in review of the draft patent  
6 applications?

7 A. I know they represented Ameren. I don't know  
8 what their relationship with Century Products was.

9 Q. Have you ever seen a letter from Armstrong  
10 Tisdal approving the filing of this patent application  
11 in the form we have before us now?

12 MR. JULANDER: Ask him a broader question if  
13 you don't mind. "Have you ever seen a letter from  
14 Armstrong Tisdal" because that would be unusual, but  
15 it's up to you.

16 BY MR. ROBINSON:

17 Q. Have you ever seen a letter from anybody,  
18 either Armstrong Tisdal, Century Products, or Ameren --

19 A. Yes.

20 Q. -- of those three sources approving the filing  
21 of this application in the form we have before us now?

22 A. That's different. That's different. No.

23 Q. Did you notify Armstrong Tisdal, Ameren, or  
24 Century Products of the filing of this application when  
25 it was filed?

1 A. When it was originally filed?

2 Q. Right.

3 A. When it was originally filed --

4 Q. With the U.S. Patent Office.

5 A. -- at least, Century Products I know had a copy  
6 of the final application that was sent.

7 Q. Okay. Did you notify them that the patent  
8 application had been filed?

9 MR. JULANDER: Objection. Vague and ambiguous.

10 THE WITNESS: Well, they were involved  
11 intimately in this filing. They read it. They made  
12 changes. It was sent to their own patent attorneys, and  
13 we together in effect filed this with Kilpatrick  
14 Stockton for them to file with the patent office.

15 BY MR. ROBINSON:

16 Q. We together? Who do you mean?

17 A. Century Products people. I think there were  
18 direct discussions with Armstrong Tisdal about what  
19 their thoughts were. Armstrong Tisdal called these  
20 people, Kilpatrick Stockton, and discussed the patent  
21 with them. They had many conversations together even  
22 without me, and then a filing was made which eventually  
23 Ameren put on their milestone chart that the need to  
24 file a patent was satisfied. So, I'm not sure who filed  
25 what piece of paper saying it's okay, but everyone knew

1 what we were doing, and everyone could see it. I don't  
2 know about letters.

3 Q. I guess the question I have is: when this  
4 patent application was filed with the patent office, did  
5 you notify Century Products, Ameren, or Armstrong Tisdal  
6 that the patent application had been filed?

7 MR. JULANDER: Objection. Vague and ambiguous.

8 THE WITNESS: The answer is yes.

9 BY MR. ROBINSON:

10 Q. How did you notify them?

11 A. I probably showed, at least, John Taylor the  
12 letter from Bruce Gray saying it had been filed.

13 Q. Do you have a recollection of that?

14 A. Not a clear recollection -- no..

15 Q. In the documents you've provided to us there is  
16 no letter from Bruce Gray saying the application had  
17 been filed, so is there another letter from Mr. Gray  
18 somewhere that we haven't been provided?

19 A. There could be, yes. Sure.

20 Q. Could you through your lawyer provide us a copy  
21 of that letter?

22 A. Bruce Gray, yes.

23 Q. All right. And you're saying that you had  
24 previously provided to Century Products a copy of this  
25 application in its present form, correct?

1 A. I didn't say that.

2 Q. Okay. What did you say?

3 A. I said I gave him a copy of the original filing  
4 that went through Kilpatrick Stockton to the patent  
5 office.

6 Q. What do you mean by that? What do you mean  
7 original filing?

8 A. We filed for patent. The original application  
9 that went to Kilpatrick Stockton to file was given to  
10 Century Products.

11 Q. All right. Well, isn't this the original  
12 application right here that we're looking at?

13 A. I don't believe it is.

14 Q. What is this?

15 A. Hold on a second.

16 Q. I'm referring now to --

17 A. Okay. I take it back. This is the original.

18 MR. JULANDER: Objection. Vague and ambiguous.  
19 When you say, "this" -- this is a multitude of  
20 documents.

21 MR. ROBINSON: Well, the pages we've been  
22 talking about for the last 15 minutes. Pages 2068  
23 through 2095.

24 BY MR. ROBINSON:

25 Q. You understood that, didn't you, sir, that



1 that's what I was referring to?

2 A. Well, you also asked me about letters.

3 Q. No. But 2068 through 2095 is a copy of the  
4 patent application that was filed with the patent  
5 office, correct?

6 A. Correct.

7 MR. JULANDER: Objection. Vague and ambiguous  
8 as to what you mean by the patent application.

9 BY MR. ROBINSON:

10 Q. All right. Let's turn to page --

11 MR. JULANDER: Hold on. Just one second.

12 BY MR. ROBINSON:

13 Q. Ready?

14 A. Yes. Thank you.

15 Q. Can you turn to Page 2090, please.

16 A. Yes. Okay.

17 Q. And starting at Page 2090 are the claims of the  
18 patent application; am I correct?

19 A. That's correct.

20 Q. I would like you to read silently to yourself  
21 Claim No. 1. And it's very lengthy, and there's a lot  
22 of big words, and I'm not going to try to read it into  
23 the record. It begins under what is claimed as No. 1,  
24 "a polymer matrix composite material, comprising:" and  
25 then three subparagraphs.

1 A. And you just want No. 1?

2 Q. Right. Just read it to yourself.

3 A. Okay.

4 Q. Okay. Can you tell me what that claim relates  
5 to?

6 MR. JULANDER: Objection to the extent that it  
7 calls for expert opinion and to the extent that it calls  
8 for a legal opinion.

9 MR. ROBINSON: All right. Fine. You can have  
10 that continuing objection. I understand.

11 BY MR. ROBINSON:

12 Q. But you did participate in the preparation of  
13 this patent application; am I correct?

14 A. I did.

15 Q. And you did approve before it was filed?

16 A. Yes.

17 Q. And you thought you understood what was in it  
18 before it was filed, correct?

19 A. Yes.

20 Q. All right. Now tell me what you think  
21 Paragraph Claim 1 means.

22 A. In effect it's the trade secreted part of the  
23 trade secreted information we've already discussed here  
24 with isocyanates and polyols. Two polyols at least.

25 Q. Does it refer to the material or the product

1 that is manufactured using the Century-Board process?

2 A. Yes.

3 Q. Now if you would turn over to Page 2092.

4 A. Yes.

5 Q. Would you read to yourself Claim No. 14.

6 A. Yes.

7 Q. And this starts out, "A method of producing a  
8 polymer matrix composite, comprising:" and then a series  
9 of substatements. Is Claim No. 14 the method of  
10 producing the material that's described in Claim No. 1?

11 A. I'm not quite sure what your question means.

12 Q. Well, Claim No. 1 states that it relates to a  
13 polymer matrix composite material. Claim No. 14 states  
14 it relates to a method of producing a polymer matrix  
15 composite.

16 And my question is whether Claim No. 14 relates  
17 to or has to do with a method of producing the material  
18 that's described in Claim No. 1.

19 A. Well, Claim No. 14 does not contain all the  
20 things that are in Claim No. 1.

21 Q. I understand it doesn't contain all the things.  
22 I'm just asking if Claim No. 14 is a claim related to a  
23 method of producing the material that's described in  
24 Claim No. 1.

25 A. It's one way of producing some -- yes. It's a

1 way of mixing, producing No. 1. Yes.

2 Q. So, No. 1 and No. 14 are related in that No. 1  
3 talks about the material, and No. 14 talks about a  
4 method producing the material, correct?

5 A. Well, assuming there's no legal difference,  
6 which I wouldn't know about, yes, I think you're right.

7 Q. In reading Claim No. 1, there's a 1 in  
8 parenthesis and then three other subjects headed a, b,  
9 and c. Claim 1 subparagraph 1b reads, "A first polyol  
10 selected from the group consisting of polyether polyols  
11 and polyester polyols having a first molecular weight."

12 And we go on to Clause C, "An optional second  
13 polyol selected from the group consisting of polyether  
14 polyols and polyester polyols having a second molecular  
15 weight lower than the first molecular weight."

16 Do you see that?

17 A. Yeah.

18 Q. When I go over to Claim 14, I see the  
19 following: "A method of producing a polymer matrix  
20 composite comprising" and then Subclause 1 in  
21 parenthesis, "Mixing a first polyether polyol having a  
22 first molecular weight and a second polyether polyol  
23 having a second molecular weight higher than the first  
24 molecular weight with one or more catalysts, water, and  
25 optional surfactant."

1           So, perhaps you can explain, but I'm confused  
2 because in Claim 1 you talk about the first polyol  
3 having the higher molecular weight, and in Claim 14 you  
4 talk about the second polyol having the higher molecular  
5 weight.

6           Are those consistent in your estimation?

7       A.    They're consistent. That may not be the best  
8 way to write it, but they're certainly consistent.

9       Q.    Okay. Explain to me how they're consistent.

10      A.    You're saying you're going to dump into a  
11 bucket A and B which is higher molecular weight. You  
12 could also just say B and a lower molecular. It doesn't  
13 really matter which is which. It's the same. One is  
14 higher, and one is lower. It depends which one you  
15 start with, I guess.

16      Q.    All right. So, you're saying the polyols  
17 referred to as the first polyols in Claim 1 might really  
18 be --

19      A.    The second.

20      Q.    -- the second polyol in Claim 14?

21      A.    Yes..

22           MR. TREMBLAY: Can I ask a question? Is there  
23 anywhere within the four corners of the document that  
24 that's described as a reference to one, reference to two  
25 in 14? The reference to the first polyol being the

1 second in Claim 14.

2 THE WITNESS: I can't imagine the reason that  
3 was done. It's probably just an oversight, but it  
4 doesn't make any difference. It's the same.

5 MR. TREMBLAY: But the answer to my question  
6 is: "There's nowhere in the four corners" --

7 THE WITNESS: I haven't read this.

8 MR. JULANDER: If you really want an answer to  
9 that, we'll go out and --

10 MR. TREMBLAY: No. I just want to know if he  
11 knows.

12 THE WITNESS: I don't know.

13 MR. TREMBLAY: Thank you. No. I can read it  
14 as well as anybody else.

15 THE WITNESS: But you want my interpretation.

16 MR. TREMBLAY: No. I wanted to know if you  
17 knew as you sit here.

18 THE WITNESS: I don't know.

19 MR. TREMBLAY: Thank you for letting me ask  
20 that question.

21 BY MR. ROBINSON:

22 Q. We talked a little bit this morning about how  
23 the process involves a rigid polyol and a rubbery  
24 polyol. Do you have that in mind?

25 A. Yes.

1 Q. In Claim 1 can you tell me which of the polyols  
2 refer to is the rigid polyol and which is the rubbery  
3 polyol?

4 A. It's not referring to rigid and rubbery  
5 polyols.

6 Q. I know it isn't. That's why I'm asking you the  
7 question.

8 A. Well, the answer is: it doesn't refer to rigid  
9 and rubbery polyols. It refers to polyols with  
10 different molecular weights.

11 Q. Okay. But would it be fair to conclude -- I  
12 know the claim doesn't refer to rigid and rubbery. What  
13 I'm asking you is: since I understand that we're  
14 dealing with rigid and rubbery polyols whether you can  
15 identify in Claim 1 which is a rigid polyol and which is  
16 a rubbery polyol?

17 A. Well, assuming that that's all because rigid  
18 and rubbery isn't the only thing that happens when you  
19 change the molecular weight. There are other things,  
20 too, but to just focus on that one area, it's Item C,  
21 having a lower molecular weight would be the rigid  
22 polyol.

23 Q. Okay. And Item B with a higher molecular  
24 weight would be a rubbery polyol, correct?

25 A. Well, as you know, all kinds of other things

1 come into play, but yes, generally that's true.

2 Q. I just want to make a note here. All right.

3 And moving over to Claim No. 5, which is, I  
4 believe, what they call a dependent claim, and that  
5 refers back to Claim 1, it reads, "The polymer matrix  
6 composite material of Claim 1 wherein the second  
7 polyether polyol is present in an amount between 0 and  
8 about 20 percent weight of the first polyether polyol."

9 Do you see that?

10 A. Yes.

11 Q. And would I be correct in interpreting that  
12 based on the item set forth in this claim, you would  
13 have a relatively higher proportion of the rigid polyol  
14 and a lower proportion of the rubbery polyol?

15 A. That's correct.

16 Q. And in the ratio stated there, correct?

17 A. Correct.

18 Q. And has that been consistently a feature of the  
19 Century-Board process?

20 A. No. No.

21 Q. Okay. Is there anywhere in this patent  
22 application that you're aware of where the claim  
23 reflects a higher percentage of the rubbery polyol as  
24 compared to the rigid polyol with a ratio of rubbery to  
25 rigid as more rubbery, less rigid?



1 MR. JULANDER: Would you like him to review the  
2 document?

3 MR. ROBINSON: Sure.

4 THE WITNESS: You want me to read the whole  
5 patent or just the claims?

6 BY MR. ROBINSON:

7 Q. Just read the claims.

8 A. Where the rigid is in the lower proportion than  
9 the rubbery?

10 Q. Right.

11 A. Remember we're not talking about rigid and  
12 rubbery. We're talking about molecular weights.

13 Q. Okay.

14 A. Okay. Tell me the question again.

15 (The record was read)

16 THE WITNESS: Yes. No. 14, Claim 14.

17 BY MR. ROBINSON:

18 Q. In Claim 14?

19 A. Because in Claim 14 it doesn't talk about which  
20 is bigger, which is more of. It just talks about the  
21 molecular weight alone.

22 Q. So, as you read Claim 14, it would permit --

23 A. High rubbery content.

24 Q. -- a higher ratio of rubbery to rigid; is that  
25 correct?

1 A. That's correct.

2 Q. Looking over at Page 2082 --

3 A. Yes.

4 Q. -- it reads at the bottom, "Representative  
5 suitable compositional ranges for synthetic lumber in  
6 percent based on the total composition are provided  
7 below."

8 A. Yes.

9 Q. Rigid polyol about 6 to about 18 percent.  
10 Flexible polyols are about 10 percent.

11 So, you're saying there may be instances when  
12 there's more flexible than there are rigid, correct?  
13 Based on these percentages.

14 A. Obviously it would be outside this, but I think  
15 maybe you're leading -- no. I don't want to speculate.

16 MR. TREMBLAY: I don't know whether he answered  
17 the question.

18 THE WITNESS: What's the question?

19 (The record was read)

20 THE WITNESS: Let me amend that.

21 BY MR. ROBINSON:

22 Q. What did you mean by, "it would be outside  
23 this"?

24 A. Well, it's clear the way this is written, you  
25 could have 10 percent flexible and six percent rigid.

1 Q. Okay.

2 A. That would be allowed, so the answer to your  
3 question is what you said about the rubbery being higher  
4 than the rigid could be allowed here.

5 Q. All right. Are there any instances where you  
6 have records of having made product with a higher ratio  
7 of flexible and a lower ratio of rigid?

8 MR. JULANDER: Objection. Vague and ambiguous.

9 THE WITNESS: You're talking about prior to  
10 Century Products?

11 MR. ROBINSON: Right.

12 THE WITNESS: The answer is yes, but I think  
13 there's something you need to define, a definition we  
14 have to look at. You're using rigid and flexible as two  
15 classes of polyols. That isn't quite the way you look  
16 at polyols. There isn't just only rigid and only  
17 flexible. There could be things that fall in the  
18 middle. For example, if you had the right rigid and the  
19 right flexible gave you great properties, you may say,  
20 "Let's find one that fits right in the middle that has  
21 both properties," and you might use one polyol. So, is  
22 that a rigid or a flexible? It doesn't fit the  
23 definition, and that's what you're running into here. I  
24 think I know where you're headed with this, and you're  
25 trying to classify all polyols as rigid and flexible

1 where they're not.

2 BY MR. ROBINSON:

3 Q. All right. Let's turn over to Page 2083.

4 A. Okay.

5 Q. That's just the next page that we were looking  
6 at. It starts off by saying, "The invention can be  
7 further understood by reference to the following  
8 non-limiting examples. Example 1: a polymer composite  
9 composition was prepared by introducing 9.5 weight  
10 present rigid polyol (Multranol 4035, Bayer), 0.3 weight  
11 percent rubber polyol (Arcol LG-56, Bayer.)" I'm going  
12 to stop reading there.

13 You seem to be referring here to an actual  
14 composition that was produced. Is that a correct  
15 understanding?

16 A. I believe this was an actual composition, yes.

17 Q. And when and where was that composition  
18 prepared?

19 A. Well, since it has Interstar pigment, and the  
20 fly ash is from ISG, I assume this was done in the  
21 Anaheim facility.

22 Q. All right. And further supporting that would  
23 be the reference to a 100 millimeter diameter twin screw  
24 co-rotating extruder; am I correct?

25 A. No.

1 Q. No?

2 A. Anaheim doesn't have a 100 millimeter.

3 Q. How big is the Anaheim?

4 A. 92 millimeter.

5 Q. And what's the biggest extruder you used before

6 you got to Anaheim?

7 A. It wasn't 100.

8 Q. It was about 65 millimeters?

9 A. 68, yes.

10 Q. Okay. Is there some way we can determine the

11 date upon which this composition was prepared at the

12 Anaheim facility?

13 A. I'm sure there's some way to find it, yes.

14 Q. And how would we do that?

15 A. You'd have to look for this formulation in

16 their formulation sheets.

17 Q. All right. Moving on to Example 2. This talks

18 about, "In a batch reactor, "16.4 weight percent rigid

19 polyol (Bayer 4035) was combined with 1.9 weight percent

20 flexible polyol (Bayer 3900)"

21 When and where was this --

22 A. This was done in New York.

23 Q. This was clearly done in New York?

24 A. Well, it's using products that were not in the

25 Anaheim facility.

1 Q. All right. And also a batch reactor which --  
2 did you ever use a batch reactor at the Anaheim  
3 facility?

4 A. Yes.

5 Q. In Example No. 3, "In a batch reactor 16.4  
6 weight percent rigid polyol (Bayer 4035) was combined  
7 with a 1.9 weight percent flexible polyol (Bayer 3900)"

8 Do you know where this example was generated?

9 A. In New York.

10 Q. Okay. So, the three examples, one is from  
11 Anaheim, and two are from New York, correct?

12 A. That's correct.

13 Q. Did you want to add something?

14 A. Something just occurred to me.

15 Q. All right.

16 A. No. It's all right.

17 Q. Turning over to page 2074 -- this is a little  
18 different section. I think this is in a section that's  
19 headed, "Detailed Description with Specific  
20 Embodiments," which begins on Page 5 of the application  
21 and goes over to Page 7 of the application. And I'll  
22 just read starting at the bottom of Page 2074. "The  
23 polyol or polyols used may be single monomers,  
24 oligomers, or blends. Mixtures of polyols can be used  
25 to influence or control the properties of the resulting

1 polymer network. For example, mixtures of two polyols,  
2 one a low molecular weight rubbery (relative to the  
3 second) polyol, and the other a higher molecular weight  
4 more rigid (relative to the first) polyol."

5 I thought I understood you to say earlier that  
6 the higher molecular weight was associated with a more  
7 rubbery, and the lower molecular weight is associated  
8 with a more rigid.

9 A. Yes.

10 Q. Was I correct on that?

11 A. Yes.

12 Q. Now, can you reconcile this sentence in the  
13 application with what you told me earlier about the  
14 relationship between molecular weights and  
15 rubbery/rigid?

16 A. Well, one of us is wrong.

17 Q. One of who is wrong?

18 A. Either this is wrong, or I'm wrong.

19 Q. Okay. When you say, "us," don't look at me.

20 MR. JULANDER: He was very clear.

21 BY MR. ROBINSON:

22 Q. You think this is an incorrect statement?

23 A. Yes. I think it's backwards.

24 Q. It's backwards. Okay. And then you can see it  
25 continues on. "The amount of rigid polyol is carefully

1 controlled in order to avoid making the composite too  
2 brittle (a ratio of flexible polyol to rigid polyol) of  
3 between 5 weight percent and about 20 weight percent,  
4 more particularly around 15 weight percent has generally  
5 been found to be suitable."

6 A. Correct.

7 Q. And would it be accurate to say that generally  
8 the process you described in here called for a higher  
9 ratio of rigid polyol and a lower percentage of rubbery  
10 polyol?

11 A. Generally, you use more rigid than rubbery.

12 Q. And why is that?

13 A. If you're making something like lumber.

14 Q. Well, that's sort of what I'm interested in.

15 A. Why?

16 Q. Right.

17 A. I still think we're popping into this  
18 definition of rubbery and rigid. There aren't just  
19 rubbery and rigid polyols. There are others. For  
20 example, the group in the middle, they're not really  
21 rubbery or rigid. They're a combination of the two.  
22 And what we're referring to here--maybe not as precisely  
23 as we could have been--is that if you're using the  
24 normally rubbery polyols and the normally rigid polyols,  
25 this works fine.



1 But if you're trying to include things that are  
2 in the middle that are already to combined to give you  
3 semi-rubbery polyols or slightly rubbery polyols, then  
4 this doesn't really work too well for those. But in  
5 some manufacturer's literature on polyols they will show  
6 you rubbery ones, rigid ones, and then they have some  
7 others, and so it isn't just two. There aren't just two  
8 classes.

9 Q. But the application itself talks about two  
10 classes, and so that's my frame of reference, and I  
11 think my question to you was -- and we're talking about  
12 lumber.

13 A. Yes.

14 Q. Not roofs or telephone poles or railroad ties  
15 or 18,000 other things you could make. We're talking  
16 about lumber, and in the case of lumber generally you're  
17 going to want to have, according to your application,  
18 more rigid and less rubbery, correct?

19 A. That's correct.

20 Q. Is the combination of rubbery and flexible  
21 polyol -- excuse me. Strike that.

22 Is the ratio of rubbery and rigid polyols  
23 important?

24 A. Yes.

25 Q. And can you tell me the reasons why it's

1 important?

2 A. The simple explanation is that -- I told you  
3 the way you can think of polyols. One can give you  
4 stuff like rubberbands literally, and one gives you  
5 stuff like window glass. Well, neither one of those  
6 work for lumber, so what you have to do is you have to  
7 mix the two together to give you the desired stiffness  
8 of the board, strength, impact, etc.

9 Q. So, in the case of lumber you're going to want  
10 something that has more rigid and less rubbery?

11 A. Well, there's a reason for that. Theoretically  
12 there's no reason you couldn't have it more rubbery and  
13 something very, very rigid to make it the right way.  
14 It's just what people manufacture -- if you go to Bayer  
15 and say, "I want slightly rubbery material, but very,  
16 very rigid polyols," they might have them, but generally  
17 what they make that's low cost that you'd want to use in  
18 lumber are in these rubbery and rigid ranges that we're  
19 referring to here. I think even the polyol that's used  
20 in Anaheim is in the middle kind of a polyol. It's also  
21 not a very cheap polyol. It wouldn't be the one I would  
22 choose.

23 Q. I asked a question, and I got an answer. I'm  
24 not sure --

25 Could you read the question again, please.

1 THE WITNESS: I'm not sure I gave the right  
2 answer.

3 MR. ROBINSON: There's no right answer, there's  
4 just an answer.

5 Could you read the question again, please.

6 (The record was read)

7 THE WITNESS: If you're talking about the  
8 traditional way that polyols are generally chosen or  
9 sold and low cost materials that you would want to use  
10 in lumber, I think that applies. You generally want  
11 more rigid than rubbery.

12 BY MR. ROBINSON:

13 Q. With respect to this invention that's described  
14 in this patent application, can you give me the date of  
15 conception of the invention?

16 A. Of this invention?

17 Q. Right. The one that's described in this  
18 application here that we've been talking about.

19 MR. JULANDER: Objection. It's vague and  
20 ambiguous.

21 THE WITNESS: Middle 1990s, I believe. Right  
22 after -- middle to late 1990s.

23 BY MR. ROBINSON:

24 Q. Can you be any more precise than that?

25 A. Around 1998.

1 Q. All right. And what documentation is there  
2 that would support that that was the date of conception?

3 A. Certainly the lab reports.

4 Q. You're looking at the end of the table. Those  
5 are Century Products' lab reports.

6 A. Yes.

7 Q. So, how would the Century Products' lab reports  
8 reflect the date of conception in 1998 of this  
9 invention?

10 A. Why wouldn't they?

11 MR. JULANDER: No. No. You don't know what  
12 these are at the end of the table, Wade.

13 THE WITNESS: I do.

14 MR. JULANDER: He's saying these are Century  
15 Products lab reports, not Ecomat or Century-Board..

16 THE WITNESS: I thought those were  
17 Century-Board's. Well, see. Century-Board's lab  
18 reports and lab books would show when this was first  
19 conceived, and I believe it's around 1998.

20 BY MR. ROBINSON:

21 Q. Would the Ecomat reports show that?

22 A. Yes.

23 Q. All right. If you conceived it in 1998 -- you  
24 didn't file the patent application until sometime after  
25 2003, correct?

1 A. Correct.

2 Q. Is there some reason it took five years to get  
3 the patent application on file?

4 A. I didn't want a patent application on file.

5 Q. Okay. And you intentionally did not file a  
6 patent application for what reasons?

7 A. We wanted to keep it as a trade secret.

8 Q. And what caused you to change your mind?

9 A. Ameren made it very clear they didn't want us  
10 to depend on trade secrets. They wanted us to convert  
11 the trade secrets into patents, and that was having some  
12 conditions on the funding.

13 Q. And who made this clear from the Ameren side?

14 A. I don't remember specifically which person it  
15 was, but it was even in the milestones written up for us  
16 to follow, that we had to file, at least, two patents to  
17 cover the material and the apparatus.

18 Q. Okay. A few more questions, and I hate to keep  
19 dragging you back to this application. There are a few  
20 other questions I have if you don't mind, and these are  
21 pretty simple questions, I hope.

22 I'm looking at Page 2092, and something is --  
23 you know, we started off with Claim 1 and then a series  
24 of dependent claims on Claim 1, and then we get all the  
25 way down to Claim 13, and Claim 13 reads, "The synthetic

1     lumber of Claim 13," and I read that several times, and  
2     I'll be quite candid; I don't understand. That doesn't  
3     make any sense to me. Can you explain it?

4     A.     Yes, I can. It's an error.

5     Q.     Okay. So, it should read, "The synthetic  
6     lumber of claim?"

7             MR. TREMBLAY: Whatever.

8     BY MR. ROBINSON:

9     Q.     Whatever. What? 11?

10    A.     11 sounds like a good one, yes, or it could be  
11    10, but it's one of those, yes.

12             MR. JULANDER: Or 12.

13             THE WITNESS: 12 sounds like another approach.

14    BY MR. ROBINSON:

15    Q.     At any rate, it's not 13?

16    A.     It's not 13.

17    Q.     And the same question arises down at No. 15,  
18    Claim No. 15 where it says, "The method of Claim 15."

19    A.     Maybe it's a new patent theory. I don't know,  
20    but it's obviously an error.

21    Q.     And do you have any idea what independent claim  
22    should be referenced in Claim No. 15?

23    A.     I think 14.

24    Q.     Okay.

25    A.     16, the same.

1 Q. I think we got some misnumbering. It's  
2 difficult for us to analyze some of these things with  
3 the numbers mixed up. I just want to get on the record  
4 what the numbers should be, so 16 should say, "The  
5 methods of claim"?

6 A. 15, I would say.

7 Q. All right. 19 says, "The method of Claim 19,"  
8 and obviously that's the wrong reference. What's the  
9 reference there that you think should be there?

10 MR. JULANDER: Without speculating.

11 Objection to the extent that it calls for  
12 speculation.

13 THE WITNESS: I would say 15.

14 BY MR. ROBINSON:

15 Q. All right. And Claim 20, it says, "The method  
16 of Claim 20." What's that supposed to refer to?

17 A. I'd say 15 again.

18 Q. Skipping on down to Claim 22. "The method of  
19 Claim 22."

20 A. And nobody caught this.

21 Q. Well, I don't know.

22 MR. TREMBLAY: Bob did.

23 BY MR. ROBINSON:

24 Q. You're telling me it was under review for six  
25 months by, at least, two different patent firms. Don't

1 ask me. I just work here. When a non-patent lawyer  
2 looks at this, he gets very confused.

3 THE WITNESS: I'd say 15 again. I'm guessing.

4 BY MR. ROBINSON:

5 Q. All right. And you know my day wouldn't be  
6 complete without looking at 24 and 26.

7 A. Same one, which is 15, and 25 confirms that for  
8 me, that they all should be 15.

9 Q. It appears that most of these that are  
10 incorrectly numbered should be referring back to Claim  
11 No. 15?

12 A. Yes.

13 Q. Okay.

14 MR. JULANDER: Got your money's worth there,  
15 didn't you, Wade?

16 THE WITNESS: Well, we got that same firm to  
17 file the next patent, too. We know what we're doing.

18 BY MR. ROBINSON:

19 Q. I'm not trying to -- it was confusing to me.

20 A. Okay.

21 Q. All right. I do have a question on Page 2086.  
22 2086 is just an amplification on some of the examples  
23 that precede them; is that correct?

24 A. It refers to Example 2 and 3 which are earlier,  
25 and this describes the results of making 2 and 3.



1 Q. All right. I don't know why they weren't put  
2 in the claim, but they show them separately. Let's move  
3 on. One other question I have back on Claim 1.

4 A. Claim 1?

5 Q. Right. On Page 2090.

6 A. Yes.

7 Q. I'm looking at Paragraph 2, which reads, "An  
8 optional polyisocyanurate formed by a reaction of a  
9 monomeric or oligomeric poly- or di-isocyanate with  
10 water which has been optionally added to the reaction  
11 mixture."

12 In 25 words or less can you interpret that for  
13 me? What is that referring to?

14 A. It means you can add water to foam it or not  
15 and don't foam.

16 Q. The water part is optional?

17 A. It's optional.

18 Q. What about the polyisocyanurate? I thought I  
19 understood you earlier to say that the isocyanurate was  
20 more or less a byproduct of the reaction?

21 A. It is. The reaction with water. So, if you  
22 don't add water, you don't get it. If you do add water,  
23 you do get that byproduct.

24 Q. Always?

25 A. I believe there are some ways to reduce or

1 increase the amount of polyisocyanurate when you add  
2 water, but I'm not too familiar with that. But  
3 generally -- you're talking about our systems. If you  
4 add water, you get that, and other things, too.

5 Q. And that's a byproduct of the water and the  
6 isocyanate, correct?

7 A. That's correct.

8 Q. Does there have to be a surplus of isocyanate  
9 before you get polyisocyanurate? Is the isocyanurate  
10 the byproduct of what, in effect, is left over  
11 isocyanate with water?

12 A. In our kinds of systems the water reacts first.  
13 Actually, the water is more reactive than the polyols,  
14 so it actually goes first, and then what's left goes to  
15 the polyols. Water reacts faster than polyols.

16 Q. Okay.

17 A. I don't know if I answered your question,  
18 though. I don't think I did. You were talking about  
19 isocyanate?

20 Q. Right.

21 A. You actually do. When you bounce the equations  
22 of how much polyols and isocyanate, you do change the  
23 amount of isocyanate to account for the water you're  
24 adding, so you do need excess isocyanate to make up for  
25 the water, yes.

1 Q. Okay. I'm looking at Claim 8. There's a term  
2 here that I just want to make sure I understand. It  
3 reads, "The polymer matrix composite material of Claim 1  
4 wherein the inorganic particulate material has a  
5 particle size distribution ranging from about 0.0625  
6 inches to below about 325 mesh."

7 And it's the part that says, "Below 325 mesh"  
8 that I need an explanation of if you can provide it.

9 A. I can't provide it, but it's a well-known, easy  
10 to look up particle size in inches if you want, but I  
11 don't know it offhand. It's a very, very fine -- it's  
12 like dust, but I can't tell you what the actual inches  
13 are.

14 Q. How far below 325 mesh? In other words, let me  
15 tell you what -- I've looked up this mesh stuff, and the  
16 way mesh tests work is they give sizes starting with  
17 something and going up beyond 325. 325 is kind of an in  
18 between mesh. And what it says is with this mesh test  
19 anything smaller than this size will fit through, so  
20 when you say -- if you had written down to say, "down to  
21 325 mesh," that would make some sense because I would  
22 know everything had to be 325 mesh or bigger, but when,  
23 you say, "below 325 mesh," that could be anything up to  
24 325 mesh. So, what you're really saying is 0, maybe. I  
25 don't know. That's the confusing part of this language.

1           A.     No. 325 mesh in terms of these materials in  
2           this patent application, which is fly ash, you don't get  
3           much below 325. If you were to screen the fly ash, you  
4           would get a very little bit that would get through, but  
5           very little, so it really is the end point. That's why  
6           we get away with it. 325 is a very, very fine mesh for  
7           these materials.

8           Q.     So, we could for all practical purposes ignore  
9           the below and just say 325?

10          A.     You wouldn't be missing much.

11          Q.     All right.

12          A.     Who wrote this?

13          Q.     Well, I'm sure we can amuse ourselves, but  
14          let's move on to some other pieces of paper here. I've  
15          got lots of paper.

16                   And I actually am kind of moving numerically.

17           MR. TREMBLAY: Are you going to mark these?

18           MR. ROBINSON: Did I not mark this as Exhibit  
19           5?

20           MR. TREMBLAY: You did. I'm just wondering if  
21           you're going to mark them individually.

22           MR. ROBINSON: No. I don't want to mark them  
23           individually. Let's just leave them as one exhibit.  
24           They're all numbered.

25           / / /

1 BY MR. ROBINSON:

2 Q. If you look at pages 2062 through 2066 --  
3 excuse me. 2067, it seems to me that these pages all go  
4 together, so I'm asking you to look at them together.

5 MR. JULANDER: 2062 to?

6 MR. ROBINSON: Through 2067.

7 THE WITNESS: And what's your question?

8 BY MR. ROBINSON:

9 Q. Well, first of all, do you recognize it?

10 A. Barely.

11 Q. I'm sorry?

12 A. I barely recognize it.

13 Q. But you've seen it before, correct?

14 A. I can't really say yes. I don't quite remember  
15 this, but okay. Since it's in the same package, I  
16 assume I saw it when I looked at the rest of the  
17 package.

18 MR. JULANDER: Well, let's be clear. This is a  
19 packet that's been put together by Mr. Robinson. He  
20 stapled them together. They were not stapled together  
21 in the documents that we gave him, so don't rely on the  
22 staple to determine whether or not you've seen  
23 something, whether you recognize them or anything else.

24 BY MR. ROBINSON:

25 Q. But they are documents that we received from

1 your counsel.

2 MR. JULANDER: Yes, they were received from me.

3 THE WITNESS: They're vaguely familiar.

4 BY MR. ROBINSON:

5 Q. Do you have any idea what it is?

6 A. Yes. It looks like something from the U.S.  
7 Patent Office.

8 Q. Well, it's said, "A transmittal letter" --

9 A. It's from us to the U.S. Patent Office. I'm  
10 sorry. I meant that. And it has to do with the PCT  
11 filing.

12 Q. The PCT filing?

13 A. Isn't that mentioned here as well?

14 MR. JULANDER: PCT request.

15 BY MR. ROBINSON:

16 Q. Do you know what a PCT request is?

17 A. I believe it has to do with filing  
18 international patents.

19 Q. All right. So there's no misunderstanding  
20 here, I'm looking under a block on the first page next  
21 to the heading title. It says, "Filled Polymer  
22 Composite and Synthetic Building Material Compositions,"  
23 which is the very same title that's on the application  
24 you and I just went over, and it's submitted by a Bruce  
25 Gray who is your patent counsel, correct?

1 A. Correct.

2 Q. Do you recognize your signature at the bottom?

3 A. Yes.

4 Q. So, you authorized the filing of this  
5 application with the patent office; am I correct?

6 A. I assume so, yes.

7 Q. Do you recall having seen it before it was sent  
8 in?

9 A. I don't recall that. I don't know. I  
10 certainly didn't sign it anywhere.

11 Q. Did you have any understanding as to the effect  
12 of filing an international patent application with  
13 respect to the disclosure of the contents of the patent?

14 MR. JULANDER: Objection. Vague and ambiguous  
15 as to time. Does he have an understanding today?

16 BY MR. ROBINSON:

17 Q. Well, do you have an understanding now? Let's  
18 just work back.

19 A. I have an understanding now that this would  
20 divulge the patent publicly -- an application publicly.

21 Q. Because it would be published on the internet?

22 A. Yes.

23 Q. And you know for a fact that this patent  
24 application has been published on the internet, correct?

25 A. Yes.

1 Q. And when and how did you first become aware  
2 that the filing of the international patent application  
3 would result in the publication of the original patent  
4 application on the internet?

5 A. I wasn't aware of that until I called a patent  
6 attorney after hearing from you, I believe, that it was  
7 on the internet.

8 Q. So, you --

9 A. You informed Mr. Julander that the patent was  
10 on the internet, I believe; is that correct?

11 MR. JULANDER: Well, we can stipulate to that.

12 BY MR. ROBINSON:

13 Q. But you're saying that's your first knowledge?

14 A. The first time I knew that this was public.

15 Q. And you were what? Mortified when you found  
16 out that your patent application was on the internet?

17 A. I did get some chills.

18 Q. Okay. Why would you get chills?

19 A. First, I didn't know about it. Second, I  
20 wasn't positive what the conclusion of that would be. I  
21 wasn't positive what the conclusion -- what it would  
22 mean that it was now public. I didn't know what that  
23 meant besides that it said public, but what does that  
24 mean as far as my patent application, and I had to have  
25 discussions with patent counsel to figure out what all



1 that meant.

2 MR. TREMBLAY: Mr. Gray?

3 THE WITNESS: No. I called another.

4 MR. TREMBLAY: Can we just have his identity  
5 for the record? We don't want to know what he told you  
6 yet.

7 THE WITNESS: The one in Salt Lake City.

8 MR. JULANDER: Just tell him what you remember.

9 THE WITNESS: It's a patent firm in Salt Lake  
10 City, Utah. I can't think of the name offhand.

11 BY MR. ROBINSON:

12 Q. It's the same patent firm that's handling Zack  
13 Taylor's application?

14 A. Yes, it is.

15 MR. TREMBLAY: Are you claiming attorney/client  
16 privilege on what they told him?

17 THE WITNESS: But I'm telling you.

18 MR. TREMBLAY: No. I just want to know. Are  
19 you going to reveal what they told you?

20 MR. JULANDER: And I think for right now  
21 there's no reason to reveal it, is there? I don't think  
22 it matters.

23 MR. TREMBLAY: If you don't reveal it now, you  
24 won't be able to reveal it later. That's all I'm  
25 telling you. The next question he's going to ask is:

1 what did they tell you. So, you have a right to assert  
2 the attorney/client privilege or not.

3 MR. JULANDER: It doesn't matter.

4 THE WITNESS: I don't know of any secrets  
5 involved here.

6 BY MR. ROBINSON:

7 Q. So, you're going to tell me what your patent  
8 attorney told you, right?

9 A. Yes.

10 Q. Okay. What did they tell you?

11 A. He said that when you first filed your patent,  
12 you could have chosen to have a U.S. patent only, and  
13 you could have chosen at that time to keep it secret  
14 until it issued as a patent. But if you chose  
15 international filing, automatically it will show up  
16 publicly, and you have no choice. You can't stop it.  
17 And he asked me if my patent attorney told me that when  
18 I did it because he knew this was rather important as a  
19 trade secret. I don't remember ever hearing anything  
20 about that, and he said, "Well, you're stuck with it  
21 now. That's it. There's nothing you can do about it."  
22 That's what he told me.

23 Q. If you want to add something, go ahead.

24 MR. JULANDER: Well, only if it's responsive.

25 THE WITNESS: No. I was just thinking of

1 something else.

2 BY MR. ROBINSON:

3 Q. Did you notify Century Products of the filing  
4 of the international patent application?

5 A. I think when we first filed this with Bruce  
6 Gray back when I was with Century Products, that  
7 decision of going to international patent was decided  
8 then, and they certainly were aware of that.

9 Q. That you planned to file an international  
10 patent?

11 A. Our plan is to file international patents, yes,  
12 but I'm not sure we would have done it if we would have  
13 known it was going to be on the internet before we got  
14 the patent.

15 Q. And you didn't discuss that subject with  
16 Century Products; am I correct? That is, the fact that  
17 the trade secrets would be put on the internet?

18 A. I never knew that would occur, so I couldn't  
19 have discussed it.

20 Q. The transmittal letter has a date of  
21 January 21, 2005 up in the right-hand corner.

22 Do you see that?

23 A. Yes.

24 Q. And to the best of your knowledge, was that  
25 when the application for the international patent was

1 filed?

2 A. Well, if that's what it says. I don't know  
3 that.

4 Q. But you'd have no reason to doubt that?

5 A. If that's what it says, that's what it says,  
6 but the decision to file internationally may have been a  
7 very different date.

8 Q. But you didn't write a letter to Century  
9 Products in January 2005 saying, "This is what we know,  
10 that we've filed an international patent on the  
11 Century-Board process," or words to that effect?

12 A. No, I didn't.

13 Q. And you didn't communicate in any other way  
14 with Century Products concerning that fact, correct?

15 A. At that time, no.

16 Q. At any later time?

17 A. At an earlier time. I said when this was  
18 discussed initially, when I was at Century Products all  
19 the decisions I think we needed to make were made.

20 Q. All right. About halfway down the page,  
21 there's a block that says, "Earliest priority date,  
22 (day/month/year) January 23, 2004."

23 A. Yes.

24 Q. What does that date refer to, sir?

25 MR. JULANDER: Without speculating.

1           THE WITNESS: I'm not really sure what that  
2 means. I assume -- I can guess, and speculate that  
3 that's the date we sent it to Bruce Gray or Bruce Gray  
4 sent it to the patent office.

5 BY MR. ROBINSON:

6       Q.    You mean the original patent application, the  
7 U.S. patent application?

8       A.    I guess so, yes.

9       Q.    All right. Further down there's a space there  
10 with four letters; A, B, C, and D. Next to C there's a  
11 rectangular box, and there's an X inside it. To the  
12 right-hand side of that checked box appears the  
13 following: "The following prior U.S. applications  
14 contain subject matter which is related to the invention  
15 disclosed in the attached international application."  
16 And then a little further down there's a series of  
17 boxes, and there's the application number, and then the  
18 No. 10/764012.

19           Do you see that?

20       A.    Yes.

21       Q.    "Filed on January 23rd, 2003." What does that  
22 refer to?

23       A.    Well, obviously I don't know what these numbers  
24 mean. I assume that is the earliest date we did  
25 something with Bruce Gray or the patent office, but I

1 don't really know what these numbers mean, these dates.

2 Q. Did you file something with the patent office  
3 on January 23rd, 2003?

4 A. I don't know.

5 Q. Is there some way to find out?

6 A. I assume some of this other documentation  
7 refers to dates.

8 Q. Well, we're going to go through the rest of the  
9 documentation. I'm just asking for your knowledge.

10 A. I don't know the date.

11 Q. Because this is appears --

12 MR. TREMBLAY: Guys, you're talking over each  
13 other.

14 BY MR. ROBINSON:

15 Q. This appears to refer to something that was  
16 filed in 2003 which is before you sent any kind of draft  
17 applications to Armstrong Tisdal; is that correct?

18 A. I don't know that.

19 Q. Can you recall when you first sent something to  
20 Armstrong Tisdal?

21 A. I do not know the dates.

22 MR. TREMBLAY: Can I ask one question? You  
23 don't have to answer this question if he instructs you  
24 not to answer it.

25 Have you made a claim against Bruce Gray in

1 connection with the publication of this patent on the  
2 internet?

3 THE WITNESS: No.

4 MR. TREMBLAY: Do you intend to?

5 MR. JULANDER: Don't answer that. Sorry.

6 MR. TREMBLAY: We'll accept stipulation that  
7 he's following your instructions not to answer the  
8 question. If I asked him in any other way, you would  
9 instruct him so?

10 MR. JULANDER: That's right.

11 MR. TREMBLAY: Thank you for allowing me to  
12 interpose a question.

13 MR. JULANDER: No problem.

14 BY MR. ROBINSON:

15 Q. Okay. Moving forward to Page 2061 -- I suppose  
16 we may need to look at Pages 2054 through 2060 in  
17 conjunction with 2061, and I say that because 2061 is a  
18 fax cover sheet to you dated August 19, 2005, and then  
19 it refers to a total of eight pages with cover. And if  
20 I look at Pages 2054 through 2060, it appears that they  
21 may be related to this fax, so why don't you take a look  
22 at those eight pages together, and let me know if you  
23 recognize the fax cover sheet and the seven pages that  
24 precede in this package.

25 A. Okay. Yes, I've been through them.

1 Q. Do you recognize them?

2 A. Yes.

3 Q. And what do you recognize them to be?

4 A. This is where we split the patent or dropped  
5 some claims.

6 MR. JULANDER: Can I take just a second with  
7 Mr. Brown?

8 MR. TREMBLAY: Yeah.

9 (Recess)

10 MR. TREMBLAY: Mr. Julander has been kind  
11 enough to indicate to me that they're considering  
12 withdrawing all their misappropriation claims in the  
13 case, and they'll notify us shortly.

14 Within a week or so?

15 MR. JULANDER: Yes.

16 MR. TREMBLAY: Okay. Have I stated that  
17 correctly, Counsel?

18 MR. JULANDER: Yes.

19 MR. TREMBLAY: In the event that they're not  
20 withdrawn and there are a bunch of misappropriation  
21 questions I haven't asked, I would want to obviously  
22 take his deposition on just misappropriation. So, I'll  
23 just reserve that until I hear from you otherwise.

24 MR. JULANDER: I understand your statement.

25 MR. TREMBLAY: Okay.



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(Recess)

MR. ROBINSON: All right. During the break Counsel has indicated to me that Mr. Brown would like to clarify some of his prior responses concerning the patent application and some of the apparent errors in the numbering on some of the claims.

BY MR. ROBINSON:

Q. Is that correct?

A. That's correct.

Q. Go ahead and clarify.

A. The document starting at 2068 is not the final filing that was sent to the patent office.

Q. Oh, it is not?

A. It is not because it doesn't agree with the later documents coming back for this other work that was done, so I think it's quite clear this is an earlier draft with lots of mistakes in it because there's such obvious mistakes, and I can't imagine they'd let that through, and I think this isn't it.

MR. TREMBLAY: So, the final application that's been sent to the patent office hasn't been produced to us yet?

THE WITNESS: It hasn't been produced to you, that's correct.

MR. JULANDER: Although, you can download it

1 from the internet apparently.

2 THE WITNESS: It's public.

3 MR. JULANDER: And I'll help to be clear. If  
4 you look at Page 2041, you'll see what is purportedly a  
5 duplication of claims and then "withdrawn" is inserted.  
6 For example, Paragraph 19 does not refer to 19 anymore.  
7 20 does not refer to 20 anymore, etc.

8 THE WITNESS: It's been fixed.

9 MR. JULANDER: So, the document that we're  
10 looking at that includes that Page 2041 is obviously a  
11 document later in time where claims were being  
12 withdrawn, and it has in some cases very different text.  
13 So, we may even be looking at an early version of the  
14 application, but I will represent this is all I have.  
15 Now, we can go on the internet and get an absolute  
16 version, but that's the explanation.

17 MR. TREMBLAY: I'm doing that right now.

18 BY MR. ROBINSON:

19 Q. Okay. I think we were talking about the fax  
20 cover sheet and the letter dated August 19th, 2005. It  
21 appears there was some action in the patent office that  
22 led to a result that you filed what's called a Response  
23 to Restriction Requirement, and that's at Pages 2037  
24 through 2043. Am I correct, Mr. Brown?

25 A. Yes.

1 Q. And what you've done is restricted the current  
2 application to just Claims 1 through 9?

3 A. That's correct.

4 Q. And you've withdrawn Claims 10 through 14 and  
5 15 through 27, correct?

6 A. Correct.

7 Q. But that doesn't mean you're abandoning those  
8 claims, correct?

9 A. That's correct.

10 Q. So, you reserve the right to either in this  
11 application process or a later application process  
12 resubmit those claims; am I correct?

13 A. That's correct.

14 Q. I don't want to spend more time on that. I  
15 just have one other question. If you look at Pages 2034  
16 through 2035 the first page is a letter dated August 26,  
17 2005.

18 A. Yes.

19 Q. It's from Mr. Gray to you saying, "Dear, Mr.  
20 Brown, we received official notice from the U.S. Patent  
21 & Trademark Office that the referenced application was  
22 published on July 28th, 2005 and assigned publication  
23 No. US-2005-0163969-A1. A copy of that notice is  
24 enclosed." And on Page 2035 is the Notice of  
25 Publication of Application.

1           So, you testified earlier that your first  
2 awareness that your application was on the internet came  
3 as a result of a conversation with Mr. Julander, but it  
4 does appear from this correspondence that Mr. Gray  
5 notified you as early as August of 2005; is that  
6 correct?

7           A.     That's correct.

8           Q.     And do you recall receiving this letter from  
9 Mr. Gray?

10          A.     I do recall receiving it. I didn't interpret  
11 it the way you -- I didn't understand at the time it  
12 meant public public. I thought it meant published  
13 within the patent department available to the patent  
14 attorneys, not to the public. I didn't understand that.

15          Q.     So, when you read the second paragraph, "The  
16 published application will be viewable on the official  
17 website" --

18          A.     I assumed he meant he could view it but not the  
19 public.

20          Q.     Okay. So, no notification was given to Century  
21 Products of this at the time?

22          A.     That's correct.

23          Q.     Strange. Okay. Well, let me mark -- that was  
24 No. 5.

25                 THE WITNESS: Can I expand on that?

1           MR. JULANDER: Well, if it's responsive to his  
2 question.

3           THE WITNESS: It's responsive.

4           MR. JULANDER: You can expand on that if you  
5 feel it's responsive to his question.

6 BY MR. ROBINSON:

7           Q.     Go ahead.

8           A.     One of the reasons I didn't think it was  
9 available publicly is because of the very next sentence  
10 in that letter, which says, "Please let us know if you'd  
11 like us to obtain a copy of the publication." I assumed  
12 I couldn't get it myself, but he meant it just as a  
13 courteous, I guess.

14          Q.     And you didn't follow up with him?

15          A.     I didn't see a need to.

16          Q.     Let's take a quick look at Exhibit 6, which I  
17 hope won't take as much time as Exhibit 5.

18                   (31-page document entitled Transmittal  
19 Letter to the United States Receiving  
20 Office, marked Claimant's Exhibit 6 for  
21 identification.)

22           Do you recognize the documents that we've  
23 included as part of Exhibit 6? I think it starts at  
24 Page 2096 and goes through 2126.

25          A.     Yes, I do.

1 Q. And could you just generally describe what is  
2 included in this exhibit?

3 A. It's a patent application on the apparatus, the  
4 forming unit.

5 Q. And generally this relates to the forming unit  
6 that was initially used at Century Products; am I  
7 correct?

8 A. No.

9 Q. It doesn't?

10 A. It doesn't.

11 Q. What does it relate to?

12 A. It refers to the inventions that Zack Taylor  
13 had on forming units in general, not just the one in  
14 Anaheim.

15 Q. All right. If we look at Page 2097, which is  
16 part of the PCT application, we note that you are listed  
17 as a co-inventor on this particular invention.

18 Do you see that?

19 A. Yes.

20 Q. And I think I can represent to you on the  
21 internet, where this application is also published,  
22 you're also listed as a co-inventor.

23 A. Okay.

24 Q. And the application, which starts at Page 2102  
25 and goes through 2126 was filed through your patent

1 attorneys in Atlanta, correct?

2 A. Yes, that's correct.

3 Q. And it appears if I go back to Page 2096, I see  
4 midway down the page a priority date of January 23,  
5 2004, and then a prior application No. 10/764013 filed  
6 on January 23, 2003.

7 Do you see that?

8 A. Yes.

9 Q. Do you recall anything being filed in  
10 January of 2003 relating to the continuous forming  
11 system utilizing up to six endless belts?

12 A. Well, it's the same question you asked about  
13 the other patent application, and I don't know what  
14 those dates mean.

15 Q. Well, with respect to the Pages 2102 through  
16 2126, is there any reason to believe that in this case  
17 the application that we were provided is not the  
18 application that was actually filed?

19 A. I believe this is the application that was  
20 filed.

21 MR. JULANDER: Well, without speculation. You  
22 can testify from --

23 THE WITNESS: No, I can't. I'm assuming that  
24 this is it.

25 MR. JULANDER: Tell him you assume that.

1 BY MR. ROBINSON:

2 Q. Based on what you have in front of you, you  
3 don't have any reasons to believe it is anything other  
4 than the application that was filed?

5 MR. JULANDER: Just don't speculate, Wade.  
6 Tell him what's in your head without speculating and  
7 confirming something that you're unable to confirm.

8 THE WITNESS: I can't confirm that this is it.  
9 That's fair. I'm trying to help.

10 BY MR. ROBINSON:

11 Q. Okay. Let's not spend a lot more time on that.  
12 Do you know when this invention was conceived?

13 A. Yes. This was when Zack Taylor and I worked at  
14 Kaiser Composite Tech. That was the actual company.

15 Q. What year was that?

16 A. 1996, 1997, somewhere in there.

17 Q. And the reason for the not filing the patent  
18 until 2004, if that's when it was filed, is the same as  
19 in the case of the materials patent, that is, you wanted  
20 to maintain the invention as a trade secret?

21 A. We decided to maintain it as a trade secret,  
22 yes.

23 Q. Now, did the first forming unit that was  
24 installed at Century Products as far as you were  
25 concerned involve practice of the technology that's



1 described in this patent application?

2 A. The best to my knowledge this covers the first  
3 forming unit in Anaheim, yes.

4 Q. Does it cover the second forming unit in  
5 Anaheim? I'm just asking your personal view. I realize  
6 this is a matter of expert testimony, but in your view  
7 of things, does the forming unit currently being used at  
8 Anaheim fall within the teachings of this patent?

9 A. I can't answer that.

10 MR. JULANDER: Would you read that last  
11 question and answer back, please?

12 (The record was read)

13 BY MR. ROBINSON:

14 Q. And my follow-up question is: why is it you  
15 can't answer it?

16 A. I haven't read this patent application in a  
17 long time, over a year. My main contribution to this  
18 was the belts, and Zack's contribution was the  
19 mechanical stuff around the belts, and I don't know  
20 enough about what he did without reading it again  
21 thoroughly to understand that.

22 Q. I appreciate that. You say your contribution  
23 to this was the belts. Can you elaborate on that, and  
24 tell me a bit more about what you mean by that?

25 A. In here somewhere we talk about the belts that

1 are moved by the apparatus, the belts that form the  
2 lumber, and that forming of the lumbers information is  
3 something I spent a lot of time on in New York where we  
4 actually ended up making a small unit that was run at  
5 Coperion, and we also made many different box molds that  
6 had some belt designs like this even though they weren't  
7 continuous, the belt itself met some of these concepts.  
8 And what particular rubbers would work, what particular  
9 materials the belt could be made out of, that was  
10 something we did some work on in New York.

11 Q. And that's what I'm trying to get the  
12 elaboration on. A belt is just a belt. It's something  
13 that goes around and around, so there's nothing novel  
14 there. So, I guess what I'm trying to get at is what  
15 aspects of these particular belts that you consider to  
16 be novel. Was it what they were made of? Was it the  
17 width? How they were put together? I'm just having  
18 trouble envisioning.

19 A. The actual forming belts in this application  
20 are rarely flat. They're shaped, rounded, curved, and  
21 they're matching belts. There's two of them always that  
22 come together. And how they came together, what they  
23 were made out of, and they're shape is the stuff I  
24 added. I mean, Zack added some too. That was more my  
25 area. Then how the machine would work to move the belts

1 and the way they were guided from sliding or anything  
2 like that, that was what Zack focused on.

3 Q. Other than the one apparatus that you described  
4 that you made for use in New York and the one apparatus  
5 that was installed at Century Products in Anaheim, are  
6 there any other instances of apparatuses that involved  
7 the practice of the teaching of this patent?

8 A. Actually, there was one more.

9 Q. Okay.

10 A. When we were at Berstore Corporation that made  
11 extruders, we had another belt system on a conveyor that  
12 we put together for the trial runs at Berstore.

13 Q. What became of that system?

14 A. It was made just for the runs at Berstore, and  
15 we never used it again, but it's somewhat what similar  
16 to the system we used inside the New York facility.

17 Q. How large was it?

18 A. The conveyor was about 20 feet long, 15 to  
19 20 feet long. The belt, the forming belt was, maybe, 8  
20 or 10 feet long.

21 Q. How did that compare with the size of the  
22 conveyor/forming system that went in it at Anaheim? The  
23 first one.

24 A. It was close to what was done at the first  
25 unit.

1 Q. Wasn't the first unit later extended, however?

2 A. We extended, and we changed it a lot, yes. A  
3 lot of modifications to that system, yes.

4 Q. Okay. The two pre Century Products units, were  
5 those mentioned in the Ecomat reports somewhere?

6 A. They were mentioned, and the photographs were  
7 given to Century Products of the systems, and some of  
8 the products made on those conveyors were given to  
9 Century Products.

10 Q. Okay. All right. Let's move on to the next  
11 exhibit, Exhibit 7.

12 (16-page document entitled In the United  
13 States Patent and Trademark Office,  
14 marked Claimant's Exhibit 7 for  
15 identification.)

16 I'm looking at a series of documents numbered  
17 2141 through 2142, and then further on, the numbering  
18 changes. It's actually backwards, and that is because  
19 when I put this document together, I put together the  
20 figures in the order in which they were numbered, and  
21 they were kind of mixed up when I got them because there  
22 are some drawings that go with it. Those are in the  
23 back. Pages 2138 through 2140. And then there's pages  
24 at the front with some text.

25 Take a moment to look through this, and I'll

1 ask you questions as we go through the document.

2 A. Okay.

3 Q. First of all, the first page of this exhibit  
4 which bears the number 2141 in lower right-hand corner  
5 has two signatures. Zack Taylor and Wade Brown.

6 Do you see the signatures? Do you recognize  
7 this is a document you signed?

8 MR. JULANDER: You need to make those verbal.  
9 Yes?

10 THE WITNESS: Yes.

11 BY MR. ROBINSON:

12 Q. And can you tell me what this first page is?

13 A. This is the part of a filing for a provisional  
14 patent.

15 Q. A provisional patent relating to what?

16 A. To a continuous forming apparatus for  
17 three-dimensional foamed products.

18 Q. And what sort of forming apparatus are we  
19 talking about? Apparatus for making artificial lumber?

20 A. Yes. And other things.

21 Q. And when was this invention conceived?

22 A. This was part of the same package of stuff we  
23 did at Kaiser AeroTech.

24 Q. How and where is the conception documented?

25 A. I'm not sure what you mean.

1 Q. Well, you said this is part of the package of  
2 inventions we conceived at Kaiser AeroTech.

3 A. Yes.

4 Q. And I'm asking you what documentation exists.

5 (Deposition officer requests break)

6 BY MR. ROBINSON:

7 Q. Now, that you've heard it again, are you sure  
8 what I mean?

9 A. Yes.

10 Q. Okay. Go ahead and answer.

11 A. These are the same documents that Zack Taylor  
12 probably has in his files, and there's a file of ours at  
13 Century-Board, which we have not located yet of the idea  
14 files we talked about yesterday.

15 Q. But as of this date, they've not been provided  
16 to our side?

17 A. They have not been provided.

18 Q. A couple of foundational questions. The title  
19 of this is a little different than the other one. The  
20 title is, "Continuous Forming Apparatus for  
21 Three-dimensional Foamed Products," and then it mentions  
22 nine drawing sheets. I would like for you, if you  
23 could, to please take a look at the drawings at the end,  
24 and if you look through the text of this provisional  
25 application, you'll see reference to Figures 1 through

1 9.

2 A. Yes.

3 Q. And then the pages that are attached are,  
4 believe it or not, labeled Figures 1 through 9. And can  
5 you tell me are the figures that are attached to this  
6 document the figures that are referred to in the text?

7 A. I can't answer that without reading it, but I  
8 know there was a confusion of drawing. There was  
9 another set of corrected drawings, and we didn't know  
10 whether they were corrected on the No. 2 patent or the  
11 No. 3 patent, and I'm not really sure what these are.

12 Q. So, you can't tell me whether or not the  
13 figures on Pages 2132 through 2140 are the figures that  
14 are referred to in the text of the application?

15 A. Not without reading the document carefully.

16 Q. All right. I'll tell you what I'm going to do.  
17 I'm going to leave a blank spot in the depo transcript,  
18 and you'll have a chance to look at it. Let me know yes  
19 or no. Okay?

20 A. Yes.

21 (Information Requested: \_\_\_\_\_  
22 \_\_\_\_\_  
23 \_\_\_\_\_.)

24 Q. Now, I take it that this provisional  
25 application relates to an apparatus for making

1 artificial lumber out of polyurethanes, correct?

2 A. Not an apparatus, many apparatuses.

3 Q. What is the difference between the apparatuses  
4 described in this provisional application and the  
5 apparatuses described in the prior patent application  
6 that we were just talking about?

7 A. Again, without going through both patents, I  
8 really can't give you a blow by blow difference between  
9 the two patents. I do remember the intent of that,  
10 though. Do you want to hear that? Why we did the two  
11 patents.

12 Q. Well, go ahead. The intent of the second  
13 patent.

14 A. Well, I have to start with the second patent,  
15 the first apparatus patent. It was done very quickly as  
16 was the first material patent. We were under a lot of  
17 pressure to get them done quickly. There were some  
18 basic things we were trying to cover, and so we did a  
19 quick job on the first two patents to get them filed to  
20 satisfy Ameren. We realized at the time -- I'm not sure  
21 about Zack's understanding, but in my mind we knew that  
22 the first apparatus patent was rather narrow, so we then  
23 went back later -- Zack went back later and broadened  
24 the scope of the patents.

25 Q. Okay. Well, was this provisional application



1 sent to Ameren for review or to -- was it sent to either  
2 Century Products, Ameren, or Armstrong and Tisdal for  
3 review prior to the time it was filed?

4 A. No.

5 Q. And why not?

6 MR. JULANDER: Objection. Argumentative.

7 THE WITNESS: Zack was no longer working for  
8 Century Products. This was done at the request of  
9 Century-Board, and it concerns stuff he invented long  
10 before Century Products.

11 BY MR. ROBINSON:

12 Q. Did you give notice to Century Products,  
13 Ameren, or Armstrong and Tisdal of the filing of this  
14 provisional patent application?

15 MR. JULANDER: Vague and ambiguous.

16 THE WITNESS: Only through supplying papers to  
17 you.

18 BY MR. ROBINSON:

19 Q. And at no time prior to supplying papers to me  
20 did you tell anybody at Ameren, Century Products, or  
21 Armstrong Tisdal about the filing of this provisional  
22 filing application, correct?

23 A. I can't speak for Zack Taylor, but as far as I  
24 know, no.

25 / / /

1 Q. You didn't tell Zack Taylor that you gave  
2 anybody notice of the filing of the application?

3 A. No.

4 Q. Did you discuss with Zack Taylor whether you  
5 should give notice of a filing of this provisional  
6 application to either Century Products, Ameren, or  
7 Armstrong Tisdal?

8 A. I don't recall any such discussions.

9 Q. If I understand you correctly, you're saying  
10 this application is broader than the prior patent  
11 application we've been talking about.

12 Did I understand you correctly?

13 A. Well, that's probably what I said.

14 Q. I'm trying to get at the differences because  
15 you were listed as an inventor on this, and so I need to  
16 know what the differences are between -- to the best of  
17 your ability. I understand that Taylor is part of this.

18 A. Let me correct that. I'm not sure the right  
19 word is broader. This covers things that we did not  
20 cover in the first patent application on apparatus.

21 Q. Such as?

22 A. Well, I have to go back and read it, but I just  
23 remember the first one he filed did not have all the  
24 ideas we developed over the years, and we decided now  
25 things are getting -- our technology is getting viewed

1 by more people. We better file more patents.

2 Q. But what ideas are included in this application  
3 that are not included in the prior patent application?

4 MR. JULANDER: Did you ask him the question of  
5 whether or not he is the inventor? I know you made a  
6 statement to that fact, but I don't want you to be left  
7 under a misimpression.

8 MR. ROBINSON: Well, he signed this provisional  
9 application as an applicant.

10 MR. JULANDER: Do you know if that's what went  
11 to the patent and trademark office? Have you asked him  
12 that? I'm not meaning to do your job for you, but I'm  
13 trying to help you out here.

14 BY MR. ROBINSON:

15 Q. Was this provisional patent application sent to  
16 the U.S. Patent & Trademark office?

17 MR. JULANDER: The exhibit sitting in your  
18 hand, Exhibit 7.

19 THE WITNESS: I don't know what was sent to the  
20 patent and trademark office.

21 BY MR. ROBINSON:

22 Q. Did you prepare it with the intent of sending  
23 it to the patent and trademark office?

24 A. Yes.

25 Q. Do you have any reason to believe it was not

1 sent to the patent and trademark office?

2 MR. JULANDER: This Exhibit 7.

3 THE WITNESS: I give my reason now?

4 MR. JULANDER: In other words, I think his  
5 questions are premised on the idea that this document is  
6 the one, and tell him what you know.

7 THE WITNESS: I don't think this is the final  
8 version.

9 BY MR. ROBINSON:

10 Q. I didn't ask if it was the final version. It's  
11 labeled provisional patent, and pretty clearly the  
12 provisional patent isn't the final application.

13 MR. JULANDER: That's not what he said. The  
14 final version of the provisional application would have  
15 been a more complete way to say what he just said.

16 BY MR. ROBINSON:

17 Q. I see. You believe there was a later  
18 provisional patent application dated after June 24th,  
19 2004?

20 A. There was a change done to this document, which  
21 isn't reflected here, so I assume there had to be  
22 another change somewhere. I don't know how these papers  
23 work.

24 Q. What change was made?

25 A. I believe -- I'm quite sure my name was dropped

1 as an inventor.

2 Q. On the provisional patent application or on  
3 the, what they call, regular patent application?

4 A. I can't tell you which.

5 Q. Do you know that a regular patent application  
6 was filed?

7 A. I'm not sure. I believe so. I believe there  
8 was a regular patent application filed.

9 Q. And what's that belief based on?

10 A. I've had discussions with Zack Taylor and with  
11 this patent firm about the conversion of provisional to  
12 a regular patent.

13 Q. Is that law firm representing you?

14 A. I'm not sure of that actually. I don't know.  
15 They mostly work with Zack Taylor. I don't know really  
16 who they represent.

17 MR. JULANDER: Well, they represent you in  
18 connection with this application.

19 Is that fair? Is that what you mean?

20 MR. ROBINSON: Right.

21 THE WITNESS: When this was filed, I had never  
22 spoken to the patent firm.

23 BY MR. ROBINSON:

24 Q. When the provisional patent application was  
25 filed?

1       A.     Right.

2       Q.     But you spoke to them later?

3       A.     I spoke to them very recently only.

4       Q.     And they told you what?

5       A.     I believe they told me that this was filed as a  
6 regular patent.

7       Q.     After it was filed as a provisional patent?

8       A.     Yes.

9       Q.     But the provisional patent wasn't filed through  
10 the law firm in Georgia; am I correct?

11      A.     No. That's correct.

12      Q.     And we've been kind of going back and forth  
13 here. Maybe I just forgot. I was trying to get at the  
14 differences between the apparatus or apparatuses  
15 described in this particular provisional patent  
16 application and the first apparatus patent application  
17 that was filed, and we sort of got off that track a  
18 little bit.

19             You've explained in detail Taylor's role and  
20 your role and so forth and so on, but I do need to get  
21 to the extent you can provide an understanding to me a  
22 statement of your understanding of the differences  
23 between the first patent application that was filed and  
24 whatever application was filed, which is back to this  
25 second apparatus.

1       A.     I understand what you want, and I'm just not  
2     the right guy to do it. Zack Taylor would have to do  
3     it.

4       Q.     You can't give me any explanation of the  
5     differences?

6       A.     Right now I certainly can't. I mean, if I sat  
7     down and read the two patents, I could probably come up  
8     with the differences, but to make it simple and to make  
9     it clear, it probably requires Zack Taylor to say, "Here  
10    are the differences between the two," unless I ask him.  
11    I could call him up and ask him what the differences  
12    are, and he could tell me very quickly, I think.

13      Q.     To your knowledge is there any apparatus  
14    anywhere in the world and built that conforms to the  
15    specifications of the apparatus described in this  
16    provisional patent application?

17      A.     I can't answer that. I don't know.

18      Q.     Do you have any understanding as to the  
19    difference in similarities between the apparatus now in  
20    use at Century Products and the apparatuses described in  
21    this provisional application?

22      A.     I don't.

23      Q.     This, again, would have been conceived when the  
24    two of you were working at Kaiser Composite Tech; is  
25    that correct?

1 A. That's correct.

2 Q. I probably asked that already. And is there  
3 any documentation --

4 A. You asked that, too.

5 Q. You say Zack has it?

6 A. Zack has it, and somewhere we have it, too.

7 Q. All right. And would there be any  
8 documentation in the Ecomat reports of the conception of  
9 the invention described in this provisional patent  
10 application?

11 A. Well, I don't know that some of the small units  
12 that we made prior to the -- Century Products might have  
13 fit this as well. I don't know. They'd be described in  
14 the reports.

15 Q. Okay. Let's move on to Exhibit 8.  
16 (10-page document Bates stamped CB02044  
17 through CB02053, marked Claimant's  
18 Exhibit 8 for identification.)

19 MR. ROBINSON: And I'll just state for the  
20 record at the very top of the first page it says, Title:  
21 Continuous forming apparatus for three-dimensional  
22 foamed products. Inventor Zack Taylor. Serial No.  
23 11/165,071. Docket No. 3538.2.1. Replacement Sheets. 1  
24 out of 10." And then as you go, it's 3 out of 10, and  
25 so forth and so until we get to 10 out of 10.



1 Can you tell me what these pages are?

2 A. I believe these are updated or corrected  
3 drawings for the third patent, the second apparatus  
4 patent.

5 Q. How did you come in possession of these?

6 A. How did I come to be in possession of these?

7 Q. Right.

8 A. I don't recall.

9 Q. Can you think of any reason Mr. Taylor or  
10 Mr. Taylor's law firm would send you replacement sheets  
11 for the drawings or figures of a patent application and  
12 not send you the entire application?

13 A. Yes, I can.

14 Q. What would that be?

15 A. At the time the patents were being done, Zack  
16 wanted me to check the drawings, and he sent me the  
17 original ones, which are in Exhibit 7, and then he sent  
18 me separately, I believe, these replacement drawings.  
19 So, the drawings, I believe, came to me without the  
20 attached patent application.

21 Q. Well, the original drawings in Exhibit 7 appear  
22 to relate to the provisional patent application.

23 A. Yes.

24 Q. Which you had a copy of?

25 A. Yes.

1 Q. And then at some later time Zack Taylor filed a  
2 regular application; am I correct?

3 A. Yes.

4 Q. And he didn't send you the regular application,  
5 but he sent you some replacement sheets that go with the  
6 regular application. Is that what you're saying?

7 A. The patent office required the drawings be  
8 changed. They wanted changes, and they told, through  
9 the patent firm, I assume, "You have to change the  
10 format of the drawings. They're unacceptable the way  
11 they are." Zack went to a firm -- I believe he drew the  
12 originals, and he went to an outside firm that did  
13 drawings and had new drawings made and sent me a copy to  
14 show me what they were for me to check.

15 Q. And what would you be checking for?

16 A. Just inconsistencies or problems, whatever.

17 Q. Inconsistencies with what?

18 A. What we understood to be the invention. It's  
19 mainly his stuff, but there are mold belts shown in  
20 here, which is more my area.

21 Q. What does all these various numbers mean that  
22 are on the drawings? On the first page there's Figure 1  
23 and then numbers 102 and so forth. They appear to point  
24 to various parts of the drawing.

25 MR. JULANDER: Objection. Calls for

1 speculation. Lacks foundation.

2 THE WITNESS: I believe those numbers are now  
3 referred to in the actual patent application.

4 BY MR. ROBINSON:

5 Q. What makes you think so?

6 A. Because there's not much else you would ever  
7 put them on the drawing for.

8 Q. But you haven't seen the application?

9 A. I don't believe I have the application.

10 Q. Did you make any comment to Zack Taylor after  
11 your review of these drawings?

12 A. I don't recall.

13 Q. And do you have any understanding as to how the  
14 apparatus depicted in these drawings compares to the  
15 apparatus now in use at Century Products?

16 A. I haven't looked at them with that in mind. I  
17 don't know.

18 Q. And do you recall when the current apparatus at  
19 Century Products was installed?

20 A. Roughly, yes.

21 Q. When was that?

22 A. December, January. December 2004 -- no. 2003.  
23 Or January 2004.

24 Q. About six months before the submission of the  
25 provisional patent application that's shown in part of

1 Exhibit 7, correct?

2 A. If that's what it says, yes.

3 Q. Okay. All right. Why don't we take about a  
4 five-minute recess here.

5 (Recess)

6 BY MR. ROBINSON:

7 Q. I thought I heard you say at one point that you  
8 thought there were additional trade secrets either used  
9 by Century Products or which Century Products used to  
10 develop additional information that are not disclosed in  
11 Exhibit 11 or the trade secret manual.

12 MR. JULANDER: And by Exhibit 11 you mean  
13 Exhibit 3 to the deposition?

14 MR. ROBINSON: Exhibit 3 to the deposition,  
15 yes. Excuse me.

16 THE WITNESS: Correct.

17 BY MR. ROBINSON:

18 Q. And where do we find those trade secrets?

19 A. Wait a minute. I said correct, and I got --  
20 you're referring to this?

21 MR. JULANDER: It's not written down on Exhibit  
22 3, but it's a trade secret that they are either using or  
23 their process is derived from.

24 MR. TREMBLAY: Off the top of your head, can  
25 you tell us, or you got to tell us whether they're here

1 or there. That's what we're trying to find out.

2 THE WITNESS: There are things which we  
3 consider trade secrets which we've shown Century  
4 Products how to use that we may have written down in lab  
5 books or not, but generally they're going to show up  
6 somewhere in documentation, but they may not be shown as  
7 a trade secret. So, somewhere in the work papers we did  
8 at Century Products are the subjects we're talking  
9 about, but, again, not identified as trade secrets.

10 For example, the order of addition of the  
11 ingredients into the extruder or even the hand mixing.  
12 The order of addition is very critical. We haven't  
13 claimed that here as a trade secret, but it's something  
14 we learned the hard way, and it makes a big difference.  
15 BY MR. ROBINSON:

16 Q. I need to get identification of those items,  
17 and if you cannot tell me where they are or where they  
18 can be documented as having been disclosed, that's fine,  
19 but I need to know -- that's the question. What are  
20 they, and when and how are they disclosed, and where are  
21 they reported?

22 MR. TREMBLAY: Your example is good. I thank  
23 you for that, but the question to the follow up on the  
24 example, if I may, is: when did you learn that critical  
25 information?

1           THE WITNESS: With very few exceptions. Almost  
2 everything we used at Century Products was brought from  
3 Century-Board in New York. There are a few things we  
4 learned at Century Products in Anaheim there, but most  
5 of it came from New York.

6           MR. TREMBLAY: Would you concede either through  
7 your counsel or yourself that anything you learned that  
8 you consider to be a trade secret while at Century  
9 Products is Century Products' property?

10          THE WITNESS: I believe that's correct, yes.  
11 That's in the license agreement.

12          MR. TREMBLAY: And so, therefore, could you  
13 identify what are those few instances of information  
14 that would be Century Products' that are not listed in  
15 any trade secrets? Are there so few that you could just  
16 tell us what they are today?

17          THE WITNESS: I really have to think about  
18 this. This stuff is not really written down as trade  
19 secret list anywhere, so I have to go back and review in  
20 my mind or even look through some of the old data or  
21 books to see what we did do, where it came from, whose  
22 is it.

23          MR. TREMBLAY: You've given us an example. Can  
24 you identify any other examples of what you consider to  
25 be unwritten trade secrets that you first learned before

1 you came to Century-Board but you still consider to be a  
2 trade secret of Century-Board -- excuse me. Before you  
3 came to Century Products that you still consider to be a  
4 Century-Board trade secret?

5 THE WITNESS: Aside from all this?



10 THE WITNESS: Yes. Another one is to use two  
11 layers of mold release instead of one -- I mean, use two  
12 different mold releases instead of one, one on top of  
13 the other, and that is not recommended by anybody, but  
14 it turns out it works.

15 BY MR. ROBINSON:

16 Q. And that's something from CP?

17 A. No. That's something from New York. That's a  
18 New York one. Is this going to be a homework project?

19 MR. JULANDER: No. Just tell him what you know  
20 now.

21 THE WITNESS: Right now? The use of the  
22 filler, the fly ash in particular -- no. All the  
23 fillers we use, not just fly ash, all the fillers we use  
24 there are some predictors of what will make them work in  
25 the Century-Board system or the Century Products system,

1 and those predictors took a long time to figure out what  
2 they are, and they are: the bulk density, the carbon  
3 content, the calcium content, the ph, and that's it.

4 You just need to know those things, and you can  
5 predict how well the filler will work in our system, and  
6 that's quite different even from what Dr. Shutov thinks  
7 is the reason fillers work or don't work. Let's see.  
8 What else? What makes the polyols work and isocyanate  
9 work in our system. How to choose them. [REDACTED]

10 [REDACTED]  
11 [REDACTED]  
12 [REDACTED]  
13 [REDACTED]  
14 [REDACTED]  
15 [REDACTED] And all those, by the way, are from  
16 Century-Board, prior to Century Products.

17 More?

18 MR. TREMBLAY: You got to tell them all.

19 MR. JULANDER: Whatever you remember.

20 THE WITNESS: That's it. My brain is dead.

21 BY MR. ROBINSON:

22 Q. Okay. So, just to put the cap on this, you've  
23 now told us the trade secrets that were communicated to  
24 Century Products but which are not indicated in Exhibit  
25 3 to the best of your current recollection?



1 A. Yes.

2 Q. And there's, I guess, two layers of mold  
3 release, use of predictors regarding fillers, and what  
4 makes a polyol isocyanate work in your system, right?

5 A. Right.

6 Q. With respect to, we'll call them unwritten  
7 trade secrets for lack of a better term, what was  
8 your -- how and when were these disclosed to Century  
9 Products?

10 A. As we were setting up the facility, the Anaheim  
11 facility and bringing equipment in and started to make  
12 first cast boards and then extruded boards, these were  
13 shown to the people in the factory, officers of the  
14 company. We showed them. "Here's how you mix stuff.  
15 You got to do it this way." We'd write it down in the  
16 lab book. "Look. Here's how we mixed it." We would  
17 tell them, "You need two layers of mold release." We  
18 would go out and show them. "Here's one and here's two.  
19 That's the best way to do this." So, we demonstrated.  
20 We showed them how to do it.

21 Q. Who would you show?

22 A. In the beginning when these things were  
23 disclosed, it was generally someone like Ted Butteriss  
24 and some of the workers in the factory, but it was  
25 almost always someone like Ted Butteriss, maybe, Ian

1 Skidmore, (Phonetically) who was there before. We  
2 understood this was a transfer of technology, and the  
3 bosses need to know about it, so we showed the bosses  
4 how to do it. They didn't always do it themselves, but  
5 they saw what we were doing.

6 Q. Is there any recordation of this technology  
7 transfer?

8 A. Well, as I said, we probably wrote down in the  
9 lab books that we mixed in a certain order, but I don't  
10 believe it would say, "Okay. Ted Butteriss viewed  
11 this." I don't think we did things like that.

12 MR. JULANDER: You're talking about Century  
13 Products lab books?

14 THE WITNESS: Yeah, Century Products lab books.  
15 BY MR. ROBINSON:

16 Q. All right. Any other way of communicating?

17 A. Well, we did do an awful lot of demonstration  
18 of the process and materials to Ameren engineers. They  
19 were there very frequently, and we showed them all these  
20 sort of tricks, too because they wanted to know, so we  
21 would show them the same ideas. I don't think we said,  
22 "By the way, this is trade secret. Watch this." I  
23 don't think we said that, but, "Here's how we mix in  
24 buckets. First, you put this in, and then you put  
25 this." They might ask, "Why did you do that?"

1 "Well, if you don't, you'd get dust  
2 everywhere."  
3 MR. TREMBLAY: Was Kim one of the engineers?  
4 THE WITNESS: Kim was, but Kim rarely was in  
5 the factory.  
6 MR. TREMBLAY: Okay.  
7 THE WITNESS: So, we didn't show her very much.  
8 BY MR. ROBINSON:  
9 Q. Okay. Let's go back to Exhibit 4.  
10 MR. TREMBLAY: You can attach it is an exhibit  
11 if you want to.  
12 MR. ROBINSON: You want to make a copy of that  
13 and attach it as a part of Exhibit 4?  
14 THE WITNESS: It's marked quite clearly A and  
15 B, so you can easily interpret what I did.  
16 MR. JULANDER: I don't have a problem with  
17 that.  
18 MR. TREMBLAY: Some are A and b, and some are  
19 just A, and some are B, and some are the combination  
20 thereof.  
21 THE WITNESS: Ignore the yellow and everything  
22 else.  
23 MR. TREMBLAY: So, may I make a copy of this?  
24 MR. JULANDER: Yes.  
25 / / /

1           MR. ROBINSON: While he's gone, let me mark one  
2 more exhibit, and let me explain what I've done here.

3           And our next exhibit is going to be what  
4 number? Exhibit 9.

5           (90-page document, marked Claimant's  
6 Exhibit 9 for identification.)

7           Please don't mark on this because it's going to  
8 be the court reporter's.

9           THE WITNESS: Well, I should recognize these,  
10 yes.

11 BY MR. ROBINSON:

12         Q.     Now, you've given us a large pile of documents.

13         A.     Right.

14         Q.     Your counsel has given it to us. What we've  
15 been referring to as the Ecomat reports or Century-Board  
16 reports. This is our effort to go through and first of  
17 all organize them by year and by number and type in the  
18 title. Okay?

19         A.     Yes.

20         Q.     And secondly, in some instances there are some  
21 gaps that will indicate either a break between years or  
22 in some instances there were missing reports.

23         A.     Yes.

24         Q.     And I've got what you've produced with me here  
25 today if you want to look at it. And then what I did

1 was go through and copy the front page or in some  
2 instances the front two pages of each of the reports  
3 with the idea that it would help jog your memory as to  
4 what was in them.

5 A. Okay.

6 Q. It's a little unorthodox, but it's the best way  
7 I could think of to get to the point of this, and I've  
8 got the originals here to look at if you want to look at  
9 them.

10 MR. JULANDER: Can we agree that from the point  
11 that you identified this on the record as Exhibit 9 will  
12 be a highly confidential portion of the deposition  
13 transcript, which will be put in a separate book with  
14 this exhibit?

15 MR. ROBINSON: Right. That's why I saved it  
16 until I did so that we would not get it mixed into the  
17 rest of the transcript.

18 MR. TREMBLAY: Exhibit 4 is as it is.

19 The next exhibit in order will be 10.

20 (Two-page document entitled Trade  
21 Secrets - Century-Board, marked  
22 Claimant's Exhibit 10 for  
23 identification.)

24 She has a copy of it. I just want to ask you  
25 some questions on it.

1 BY MR. TREMBLAY:

2 Q. You took Exhibit 4 and in answer to Exhibit  
3 4 -- I know what I'm doing here.

4 In answer to Exhibit 4 you took a copy of what  
5 had been previously Exhibit 3 and you added A or B to  
6 what is now Exhibit 10, correct?

7 A. That's correct.

8 Q. Thank you very much. And that appears under  
9 inventor? The A or the B, correct?

10 A. Correct.

11 Q. And that's your handwriting that appears. For  
12 example, on the first line, it has B and A for use of  
13 inorganic iron oxide pigments, correct?

14 A. That's correct.

15 Q. And then that means that in answer to Exhibit 4  
16 you were including both?

17 A. That's correct.

18 Q. And then when we come down to the third one,  
19 "Use of certain levels of pigment to improve scratch  
20 resistance," you only wrote A?

21 A. That's correct.

22 Q. Because it only applies to A and not to B?

23 A. Correct.

24 Q. And that's how you did it all the way down on  
25 both pages?

1 A. Correct.

2 Q. This was your attempt to be comprehensive at  
3 this point in time in answer to Exhibit 4 inquiries,  
4 correct?

5 A. Yes.

6 Q. All right. Is there anything more you'd like  
7 to add to this?

8 A. Yes.

9 Q. Go ahead.

10 A. I did not have the patents in front of me when  
11 I did this, and I have not read the patents for quite a  
12 while so that it's the best of my recollection.

13 Q. And that's all we can ask of right now, and you  
14 wrote that on the second page in your own handwriting?

15 A. Yes, I did.

16 Q. And you've also written something else, and I  
17 want to get these writings in here so I understand what  
18 they say so nobody misinterprets it. On the second page  
19 you wrote, "Best practices." Is that part correct?

20 A. That's correct.

21 Q. "It is in patent." Have I read that correctly?

22 A. Yes.

23 Q. "But not discussed why the examples" -- well, I  
24 can't read that. What does that say?

25 A. "But not discussed why the examples disclose."

1 It's pretty choppy English, but it means something to  
2 me.

3 Q. What did it mean when you wrote it?

4 A. Okay. Some of this information is in the  
5 patents -- in the examples of the patent, in the  
6 discussion of the patent, but is not claimed as a  
7 separate invention, and is not disclosed as being the  
8 best practices, but they might very well be the best  
9 practices. Does that make sense?

10 Q. As long as it does to you. All I'm trying to  
11 find out is what you meant. On the first page you had  
12 some writing too, and I just want to get it on the  
13 record. "\*\* For Monday." Correct?

14 A. Yes.

15 Q. And then what's written after that?

16 A. "Mark all that are used in Anaheim or used to  
17 develop Anaheim regardless of the patents."

18 Q. Thank you. And then right underneath that you  
19 wrote something?

20 A. "Even if patented."

21 Q. Okay. And then off on the left margin you  
22 wrote something else.

23 A. "Except underline on Dirk's list."

24 Q. Thank you. And I think you also wrote,  
25 "Yellow." You mean highlights that appear on yours but



1 not on this exhibit. "TS today, not in patents." Trade  
2 secret today, not in patents, correct?

3 A. Correct.

4 Q. That's what you meant?

5 A. Yes.

6 Q. But we can ignore that for this exhibit,  
7 correct?

8 A. Yes.

9 Q. Then you have written down "Mushovic report  
10 government," correct?

11 A. Yes.

12 Q. And then "die and belts, reports and talk"?

13 A. Yes.

14 Q. Reports and talk?

15 A. Yes.

16 Q. What does that reports and talks refer to?

17 A. This was how did I convey it to Century  
18 Products. That trade secret.

19 Q. Thank you. And then you have something cleats.

20 A. Yes. It says, "Any cleats."

21 Q. All right. Have I now put into the record all  
22 your handwritings?

23 A. Except for the very bottom.

24 Q. Okay. What does it say at the very bottom?

25 A. It says, "their interest."

1 Q. All right. Anything else?

2 A. That's it.

3 Q. All right. Thank you very much, sir.

4 MR. ROBINSON: Okay. Now we're going to go  
5 into the sealed part.

6 MR. JULANDER: Why don't you start -- the  
7 separate book, you can start now. We didn't need to do  
8 it before, but start it now. I don't think anything was  
9 disclosed before.

10

11

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13

14 (The following pages 597 through 604 are Special Confidential  
15 and are bound under separate cover)

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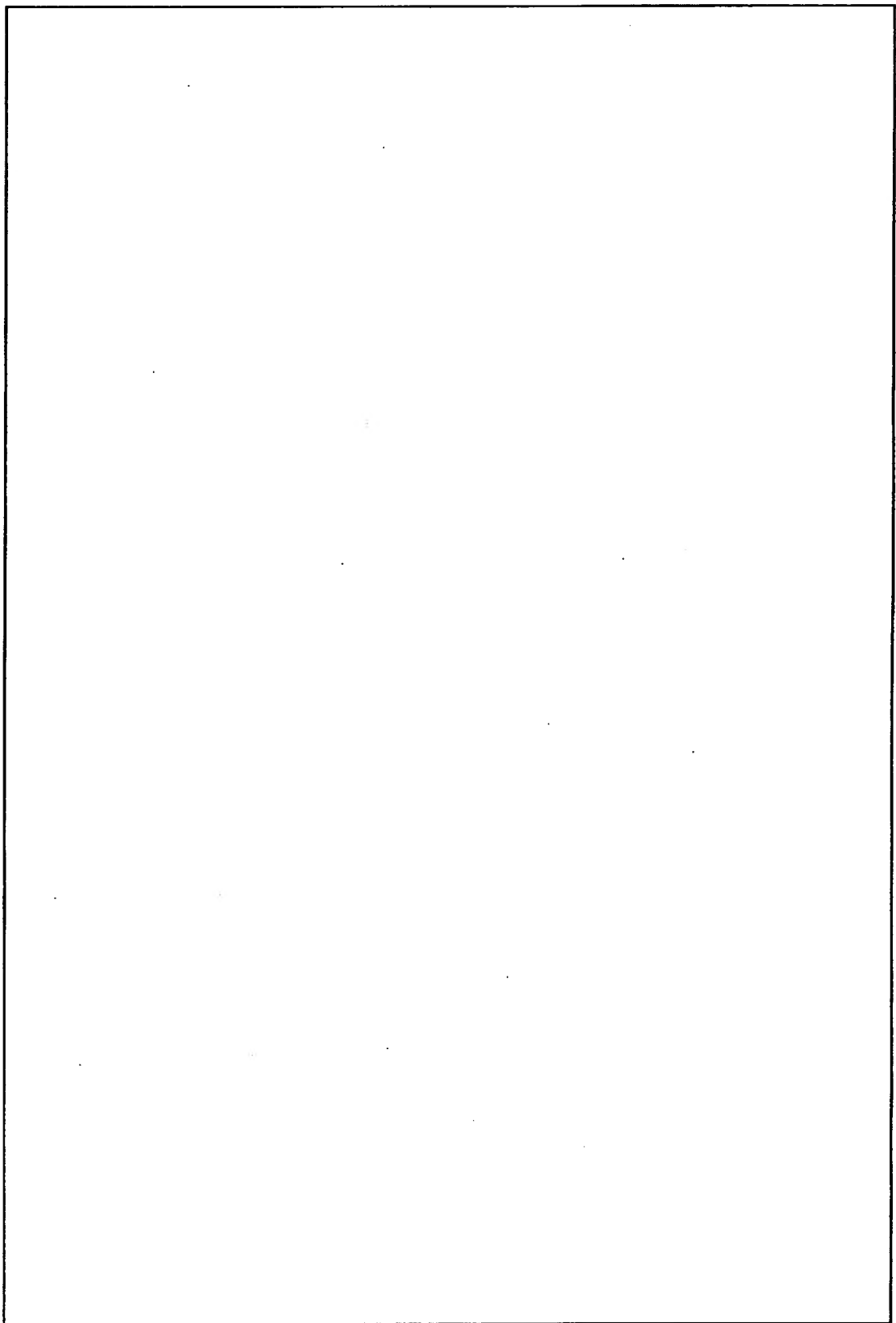
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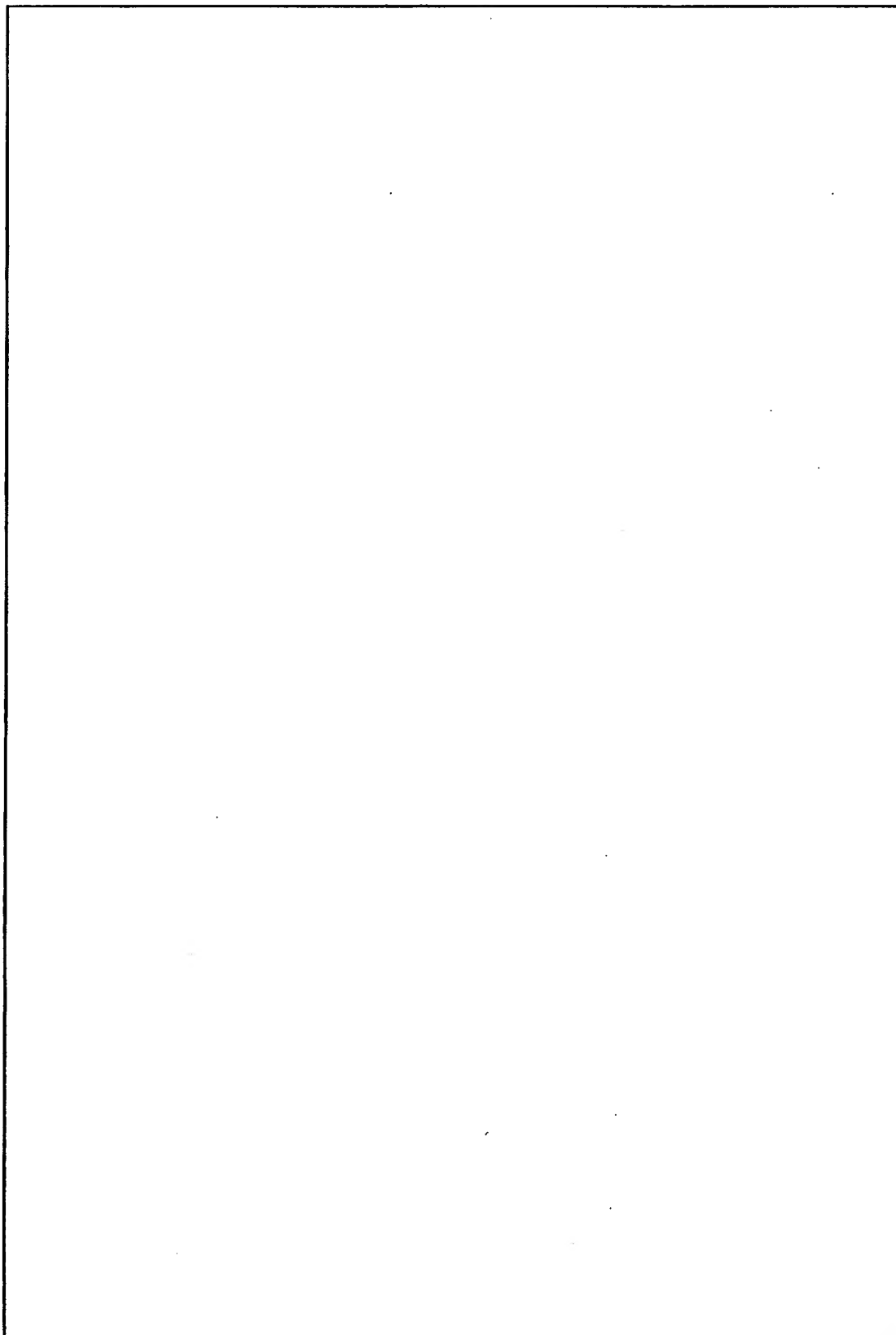
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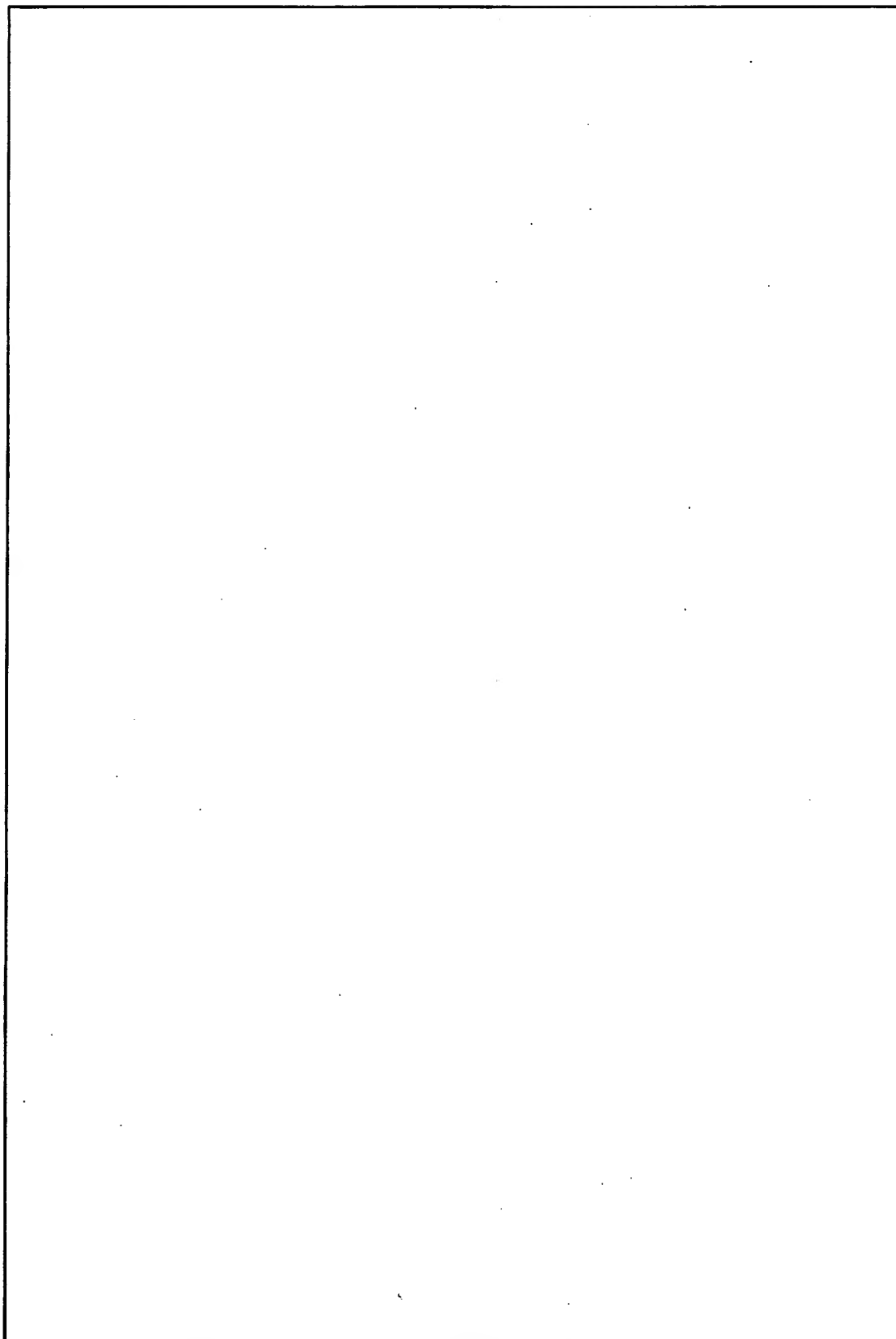
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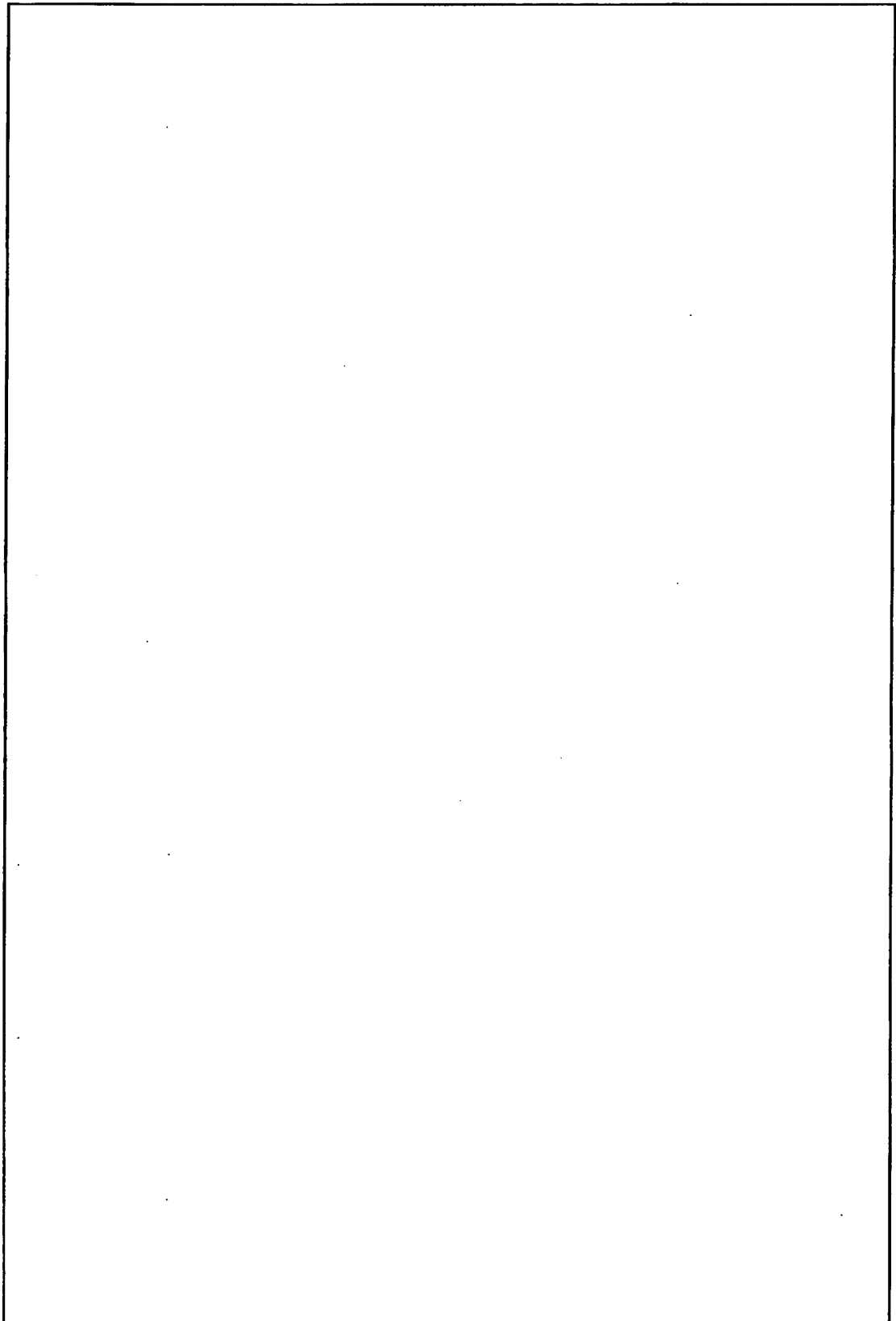
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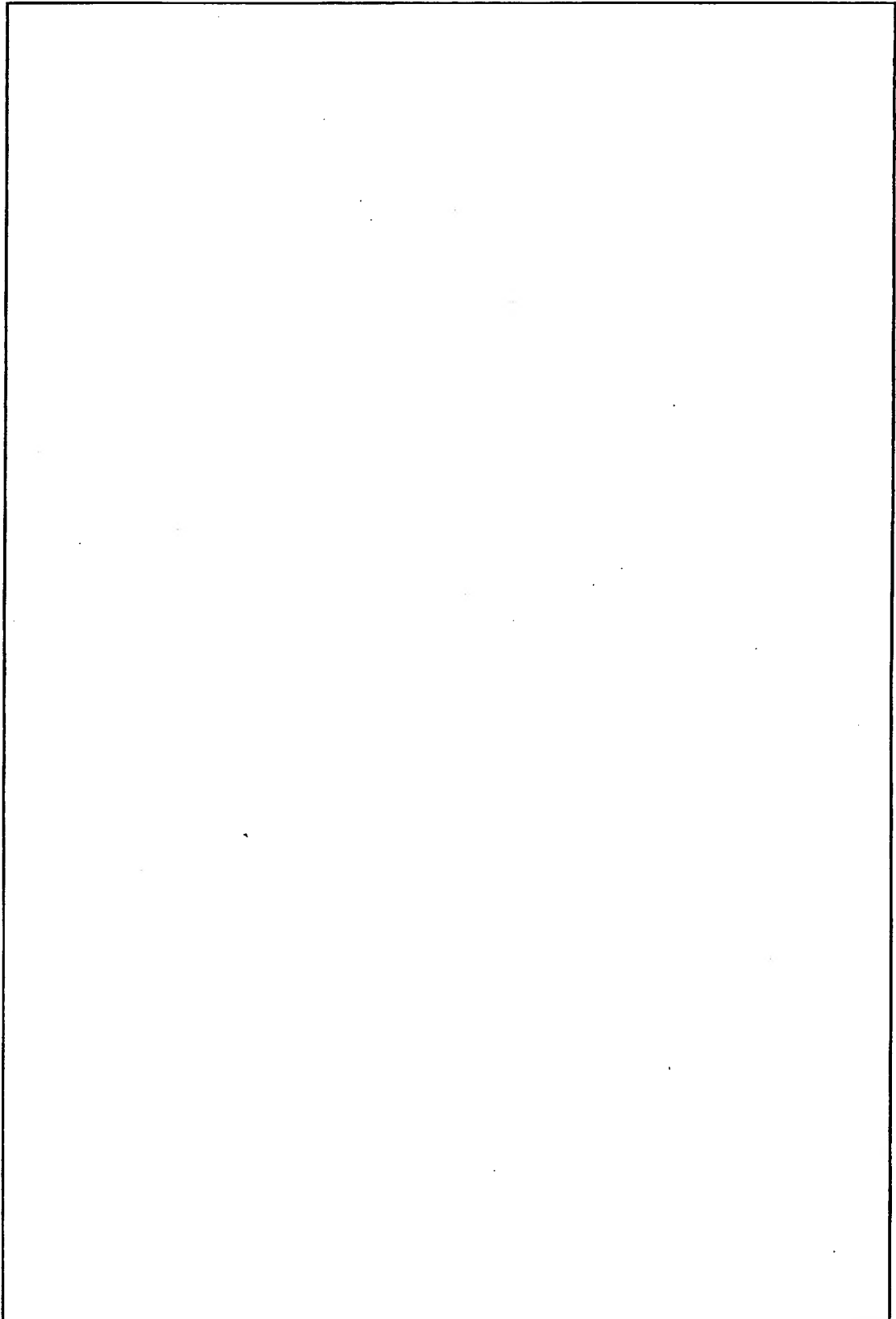
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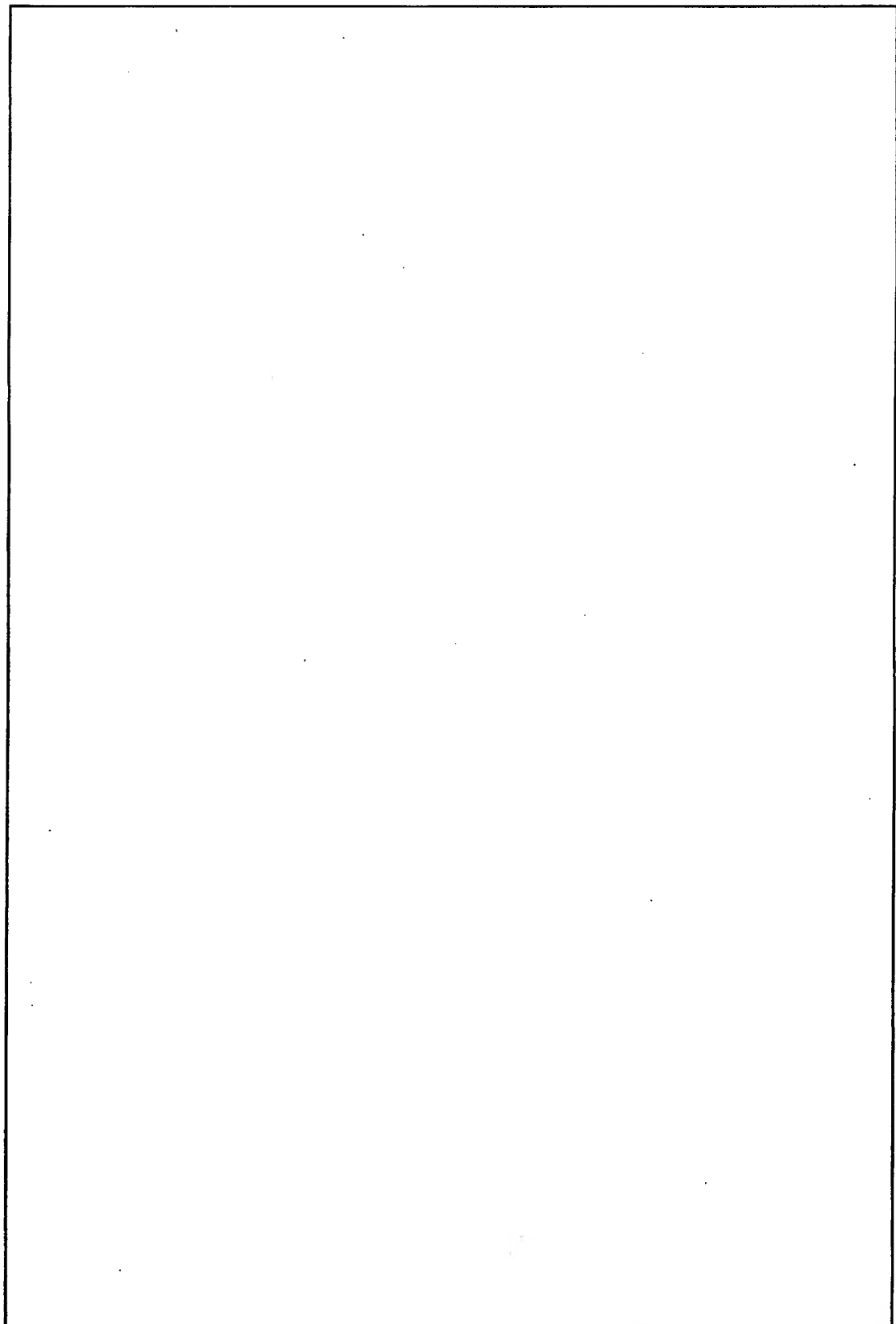
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MR. ROBINSON: That's all I have.

MR. TREMBLAY: No questions.

MR. JULANDER: Okay. Same stipulation?

MR. TREMBLAY: Yeah, she can do it.

(The deposition was concluded at 5:02 p.m.)

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I, WADE BROWN, hereby declare, under penalty  
of perjury, under the laws of the State of California,  
that the foregoing is true and correct.

Executed on this 27<sup>th</sup> day of  
December, 2005.

Waide Brown  
WADE BROWN

1 REPORTER'S CERTIFICATE

2  
3  
4 I, AMORITA LEDESMA, CSR No. 12852,  
5 Certified Shorthand Reporter, certify:

6 That the foregoing proceedings were taken  
7 before me at the time and place therein set forth, at  
8 which time the witness was put under oath by me;

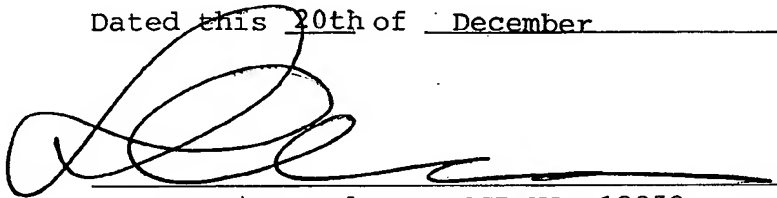
9 That the testimony of the witness and all  
10 objections made at the time of the examination were  
11 recorded stenographically by me and were thereafter  
12 transcribed;

13 That the foregoing is a true and correct  
14 transcript of my shorthand notes so taken.

15 I further certify that I am not a relative or  
16 employee of any attorney or of any of the parties, nor  
17 financially interested in the action.

18 I declare under penalty of perjury under the  
19 laws of the State of California that the foregoing is  
20 true and correct.

21  
22 Dated this 20th of December, 2006.

23  
24 

25 Amorita Ledesma, CSR NO. 12852

# Tab 4

#4

Identify from Exhibit 3 the following:

A - If it was EVER a trade secret of Wade Brown, Century Broad, or Zack Taylor that you contend the current Century Products Process was developed through the use of:

B - Of all those trade secrets identified in previous response, please identify all "developed through the use of" trade secrets that you believe are revealed in any of the patent applications recently filed by Wade Brown, Century Broad, and/or Zack Taylor.

4

# **Tab 5**

---



KILPATRICK  
STOCKTON LLP

Attorneys at Law

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August 26, 2005

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BGray@KilpatrickStockton.com

Wade H. Brown  
Century-Board USA  
9190 Butterfly Court  
Ft. Myers, FL 33919

Re: U.S. Patent Application No. 10/764,012 entitled  
"FILLED POLYMER COMPOSITE AND SYNTHETIC BUILDING MATERIAL  
COMPOSITIONS"  
Our Ref: E0055/286676

Dear Mr. Brown:

We have received official notice from the U.S. Patent & Trademark Office (USPTO) that the referenced application was published on July 28, 2005 and assigned Publication No. US-2005-0163969-A1. A copy of that notice is enclosed.

The published application will be viewable on the official Web site of the USPTO at [www.uspto.gov/patft/index.html](http://www.uspto.gov/patft/index.html), and copies can be obtained on request. Please let us know if you would like us to obtain a copy of the publication.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Bruce D. Gray

BDG/mlc  
Enclosures

ATLLIB01 2085222.1

CB02034  
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5



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
10/764,012	01/23/2004	Wade Brown	E0055/286676

CONFIRMATION NO. 8951

23370  
JOHN S. PRATT, ESQ  
KILPATRICK STOCKTON, LLP  
1100 PEACHTREE STREET  
ATLANTA, GA 30309

RECEIVED

AUG - 5 2005

DOCKETING

Title: Filled polymer composite and synthetic building material compositions

Publication No. US-2005-0163969-A1

Publication Date: 07/28/2005

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publicly available Searchable Databases via the Internet at [www.uspto.gov](http://www.uspto.gov). The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at [www.uspto.gov](http://www.uspto.gov) using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 703-305-3028.

KS Docketing

Pre-Grant Publication Division, 703-605-4283

Docketed for: 8:28:05  
Entered on: 8:19:05  
Initials: KAT  
Previously Entered: \_\_\_\_\_

CB02035

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Attorneys at Law

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Direct fax 404 541 3219  
BGray@KilpatrickStockton.com

August 23, 2005

Wade H. Brown  
Century-Board USA  
9190 Butterfly Court  
Ft. Myers, FL 33919

Re: U.S. Patent Application No. 10/764,012 entitled  
"FILLED POLYMER COMPOSITE AND SYNTHETIC BUILDING MATERIAL  
COMPOSITIONS"  
Our Ref: E0055/286676

Dear Mr. Brown:

We enclose a copy of the Response to Restriction Requirement filed with the U.S. Patent Office on August 22, 2005 in the above-referenced patent application.

We will notify you once we receive further information on this application.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Bruce D. Gray

BDG/mlc  
Enclosures

ATLLIB01 2082795.1

CB02036  
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: )  
 )  
Wade Brown )  
 )  
Serial No.: 10/764,012 ) Group Art Unit: 1772  
 )  
Filed: January 23, 2004 ) Examiner: Chevalier  
 )  
For: FILLED POLYMER COMPOSITE )  
AND SYNTHETIC BUILDING )  
MATERIAL COMPOSITIONS )

Commissioner of Patents  
P. O. Box 1450  
Alexandria, Virginia 22313-1450

Attorney Docket No. E0055/286676

RESPONSE TO RESTRICTION REQUIREMENT

Sir:

In response to the Office Action mailed on July 22, 2005, Applicant submits the following.

The Examiner has required restriction among the following claims:

- Group I, claims 1-9, drawn to polymer matrix;
- Group II, claims 10-14, drawn to a synthetic lumber; or
- Group III claims 15-27, drawn to a method of producing a polymer matrix.

Applicant elects Group I, claims 1-9, drawn to polymer matrix.

CERTIFICATION OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service on August 22 2005 with sufficient postage as first-class mail in an envelope addressed to: Assistant Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.

Typed Name of Person Signing Certification: LaTasha K. Barnes

LaTasha Barnes  
Signature

8/22/05  
Date

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In the Claims

Listing of the Claims

This listing of claims will replace all prior versions, and listings, of the claims in the application.

1. (Original) A polymer matrix composite material, comprising:
  - (1) a polyurethane formed by reaction of a reaction mixture, comprising:
    - (a) one or more monomeric or oligomeric poly- or di-isocyanates;
    - (b) a first polyol selected from the group consisting of polyether polyols and polyester polyols, having a first molecular weight; and
    - (c) an optional second polyol selected from the group consisting of polyether polyols and polyester polyols, having a second molecular weight lower than the first molecular weight; and
  - (2) an optional polyisocyanurate formed by reaction of a monomeric or oligomeric poly- or di-isocyanate with water which has been optionally added to the reaction mixture;
  - (3) an inorganic particulate material.
2. (Original) The polymer matrix composite material of claim 1, wherein the material is foamed.
3. (Original) The polymer matrix composite material of claim 1, further comprising one or more inorganic fibers disposed throughout the polymer matrix.

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**CONFIDENTIAL**

4. (Original) The polymer matrix composite material of claim 1, further comprising axially oriented fiber rovings disposed on, in, or beneath the surface of the composite.
5. (Original) The polymer matrix composite material of claim 1, wherein the second polyether polyol is present in an amount between 0 and about 20 wt% of the first polyether polyol.
6. (Original) The polymer matrix composite material of claim 1, wherein the inorganic particulate material is present in an amount ranging between about 45 wt% and about 80 wt%, based on the total weight of the composition.
7. (Original) The polymer matrix composite material of claim 1, wherein the inorganic particulate material is a fly ash, bottom ash, or particulate glass.
8. (Original) The polymer matrix composite material of claim 1, wherein the inorganic particulate material has a particle size distribution ranging from about 0.0625 in. to below about 325 mesh.
9. (Original) The polymer matrix composite material of claim 1, wherein the inorganic particulate material contains less than about 0.5 wt% water.

10. (Withdrawn) An synthetic lumber, comprising the polymer matrix composite material of claim 1; wherein the composite material comprises a relatively porous material and a relatively non-porous toughening layer disposed on and adhered to the porous material.

11. (Withdrawn) The synthetic lumber of claim 10, having a size and shape corresponding to that of commercially available lumber products.

13. (Withdrawn) The synthetic lumber of claim 11, wherein the synthetic lumber comprises at least on surface that has been embossed or impressed with a pattern.

14. (Withdrawn) The synthetic lumber of claim 13, wherein the pattern comprises a simulated wood grain.

15. (Withdrawn) A method of producing a polymer matrix composite, comprising:  
(1) mixing a first polyether polyol having a first molecular weight and a second polyether polyol having a second molecular weight higher than the first molecular weight with one or more catalysts, water, and optional surfactant;

- (2) optionally introducing reinforcing fibrous materials into the mixture;
- (3) introducing inorganic filler into the mixture;
- (4) introducing poly- or di-isocyanate into the mixture; and
- (5) allowing the exothermic reaction to proceed without forced cooling except to control runaway exotherm, thereby forming a polymer matrix composite.

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16. (Withdrawn) The method of claim 15, further comprising extruding the mixture or the polymer matrix composite through a die.

17. (Withdrawn) The method of claim 16, wherein at least a portion of the mixing or reaction, or both occurs in an extruder.

18. (Withdrawn) The method of claim 15, further comprising molding the polymer matrix composite into a desired shape.

19. (Withdrawn) The method of claim 16, further comprising forming the polymer matrix composite into a synthetic lumber.

20. (Withdrawn) The method of claim 19, wherein the forming comprises shaping the polymer matrix composite into a size and shape suitable for synthetic lumber.

21. (Withdrawn) The method of claim 20, wherein the forming further comprises embossing or impressing at least one surface of the polymer matrix composite with a pattern.

22. (Withdrawn) The method of claim 15, wherein the one or more catalysts comprise a skin-forming catalyst.

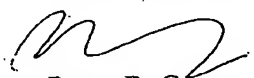
23. (Withdrawn) The method of claim 22, wherein the skin-forming catalyst comprises an organic tin compound.
24. (Withdrawn) The method of claim 15, wherein the one or more catalysts comprise a gelation catalyst.
25. (Withdrawn) The method of claim 24, wherein the gelation catalyst comprises an amine.
26. (Withdrawn) The method of claim 15, further comprising introducing axially oriented fiber rovings into the polymer matrix composite.
27. (Withdrawn) The method of claim 26, wherein the fiber rovings are introduced on, in, or beneath the surface of the composite.

U.S.S.N.: 10/764,012  
Filed: January 23, 2004  
RESPONSE TO RESTRICTION REQUIREMENT

This election is made with traverse. The Examiner has not established any undue burden on examination resulting from the presence of more than one group of claims in this application. Moreover, contrary to the Examiner's assertions, Groups I and II appear to be related as subcombination (Group I) and combination (Group II) rather than in an intermediate-final product relationship as suggested. As the Examiner is no doubt aware, a combination/subcombination relationship requires a showing of two-way distinctness for the restriction to be proper. Since the Examiner has not made such a showing, the request for restriction should be withdrawn.

The foregoing is submitted as a complete response to the Office Action identified above. Applicants await further examination in due course. No fees are believed due; however, the Commissioner is hereby authorized to charge any fees that may be required, or credit any overpayment to Deposit Account No. 11-0855.

Respectfully submitted,

  
Bruce D. Gray  
Reg. No. 45,799

KILPATRICK STOCKTON LLP  
1100 Peachtree Street  
Suite 2800  
Atlanta, Georgia 30309-4530  
(404) 815-6061

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**KILPATRICK  
STOCKTON LLP**  
Attorneys at Law

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www.KilpatrickStockton.com

August 19, 2005

*Via Facsimile*

Wade H. Brown  
Century-Board USA  
9190 Butterfly Court  
Ft. Myers, FL 33919

Re: U.S. Patent Application No. 10/764,012 entitled  
"FILLED POLYMER COMPOSITE AND SYNTHETIC BUILDING MATERIAL  
COMPOSITIONS"  
Our Ref: E0055/286676

Direct dial 404 815 6218  
Direct fax 404 541 3219  
BGray@KilpatrickStockton.com

*left mess. for Bruce*  
*22 Aug 05*  
*OK*  
*file just a group*  
*1*  
*✓*

Dear Mr. Brown:

Enclosed for your information and file is a non-final office action issued July 22, 2005 by the U.S. Patent Office in connection with the above-identified application. A response to this Office Action is due by August 22, 2005. This deadline is extendible up to January 22, 2005 with the payment of incremental extension fees. Due to the late reporting of the office action, Kilpatrick Stockton will pay for the first month extension of time, if needed.

Claims 1-27 are pending in this application. The Examiner stated that he found this application to contain the following three inventions:

Group 1 - Claims 1-9 drawn to polymer matrix, classified in class 428, subclass 141;

Group 2 - Claims 10-14 drawn to a synthetic lumber, classified in class 428, subclass 151;

Group 3 - Claims 15-27 drawn to a method of producing a polymer matrix, classified in class 156, subclass 60.

We will need to elect one group for prosecution in this application. We suggest the election of Group 1 because it will provide the broadest coverage.

ATLLJ001 2000298.1

ATLANTA AUGUSTA CHARLOTTE LONDON NEW YORK RALEIGH STOCKHOLM WASHINGTON WINSTON-SALEM

CB02054  
**CONFIDENTIAL**

Wade H. Brown  
August 19, 2005  
Page 2

Please give us your instructions as soon as possible. If you are interested in filing a divisional application for any of the non-elected claims at this time, please let us know.

If you have any questions, please do not hesitate to contact me.

Sincerely,



Bruce D. Gray

BDG/mlc  
Enclosures

ATIJJA01 21002/08,1

CB02055  
CONFIDENTIAL



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/764,012	01/23/2004	Wade Brown	E0045/286676	8951
23370	7590	01/12/2005	EXAMINER	
JOHN S. PRATT, ESQ KILPATRICK STOCKTON, LLP 1100 PEACHTREE STREET ATLANTA, GA 30309			CHEVALIER, ALICIA ANN	
			ART UNIT	PAPER NUMBER
			172	

DATE MAILED: 07/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10764,012	BROWN, WADE	
	Examiner	Art Unit	
	Alicia Chevalier	1772	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) ☐ Responsive to communication(s) filed on \_\_\_\_.

2a) ☐ This action is FINAL.      2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) ☒ Claim(s) 1-27 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.

5) ☐ Claim(s) \_\_\_\_ is/are allowed.

6) ☐ Claim(s) \_\_\_\_ is/are rejected.

7) ☐ Claim(s) \_\_\_\_ is/are objected to.

8) ☒ Claim(s) 1-27 are subject to restriction and/or election requirement.

**Application Papers**

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All    b) ☐ Some \*    c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date, ____.
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
Paper No(s)/Mail Date, ____.	6) <input type="checkbox"/> Other: ____.

Application/Control Number: 10/764,012

Page 2

Art Unit: 1772

### DETAILED ACTION

#### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-9, drawn to polymer matrix, classified in class 428, subclass 141.
  - II. Claims 10-14, drawn to a synthetic lumber, classified in class 428, subclass 151.
  - III. Claims 15-27, drawn to a method of producing a polymer matrix, classified in class 156, subclass 60.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate product is useful to make other than the final product (MPEP § 806.04(b), 3rd paragraph), and the species are patentably distinct (MPEP § 806.04(h)). In the instant case, the intermediate product is deemed to be useful as flooring coverings and the inventions are deemed patentably distinct since there is nothing on this record to show them to be obvious variants. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions anticipated by the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.
3. Inventions I and III are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be

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Application/Control Number: 10/764,012

Page 3

Art Unit: 1772

used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by a materially different process such as forces cooling.

4. Inventions II and III are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are method of making the intermediate product and the final product synthetic lumber.

5. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification and have acquired a separate status in the art because of their recognized divergent subject matter and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

6. A telephone call was made to Bruce D. Gray on July 12, 2004 to request an oral election to the above restriction requirement, but did not result in an election being made.

Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

#### *Conclusion*

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alicia Chevalier whose telephone number is (571) 272-1490. The examiner can normally be reached on Monday through Friday from 8:00 am to 4:00 pm.

CB02059  
CONFIDENTIAL

00/10/2000 17:00 FAX 404 010 0000

Application/Control Number: 10/764,012

Page 4

Art Unit: 1772

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached on (571) 272-1498. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Alicia Chevalier*

Alicia Chevalier

7/20/05

CB02060  
CONFIDENTIAL



Attorneys at Law

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August 19, 2005

direct dial 404 541 6812  
direct fax 404 541 3473  
MCollins@KilpatrickStockton.com

**FAX**

RECIPIENT/ PHONE NO.	FAX NO.	COMPANY/ CITY, STATE, COUNTRY
Wade Brown (239) 454-4908	(239) 454-7247	Century Board Ft. Myers, FL

Matthew L. Collins  
FROM

8  
PAGES (WITH COVER)

2838  
REFERENCE NO

E0055/286676  
CLIENT/MATTER NO.

**PLEASE CALL 404 815 6497 IF YOU HAVE DIFFICULTY WITH THIS TRANSMISSION.****CONFIDENTIALITY NOTE:**

The information contained in this fax message is being transmitted to and is intended for the use of the individual named above. If the reader of this message is not the intended recipient, you are hereby advised that any dissemination, distribution or copy of this fax is strictly prohibited. If you have received this fax in error, please immediately notify us by telephone and destroy this fax message.

**COMMENTS**

Re: U.S. Patent Application No: 10/764,012  
FILLED POLYMER COMPOSITE AND SYNTHETIC BUILDING MATERIAL  
COMPOSITIONS  
Our Ref: E0055/286676

Please see attached correspondence regarding non-final office action issued July 22, 2005.

Thank you,  
Matthew L. Collins  
Paralegal

**TO BE COMPLETED BY KS OPERATIONS CENTER**

TRANSMISSION RECEIPT DATE/TIME: \_\_\_\_\_

COMPLETED BY: \_\_\_\_\_

JOB CODE

16420



**TRANSMITTAL LETTER TO THE  
UNITED STATES RECEIVING OFFICE**

Date	January 21, 2005
International Application No.	NEW
Attorney Docket No.	E0055/286676

**I. Certification under 37 CFR 1.10 (if applicable)**

<b>EV 333519817 US</b>
Express Mail mailing number

<b>January 21, 2005</b>
Date of Deposit

I hereby certify that the application/correspondence attached hereto is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 FR 1.10 on the date indicated above and is addressed to Mail Stop PCT, Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450.

Signature of Person mailing correspondence
--

<b>KATHLEEN BENNETT</b>
Typed or printed name of person mailing correspondence

**II ☐ New International Application**

<b>TITLE</b>	<b>FILLED POLYMER COMPOSITE AND SYNTHETIC BUILDING MATERIAL COMPOSITIONS</b>
--------------	--

Earliest priority date (Day/Month/Year)
<b>January 23, 2004</b>

**SCREENING DISCLOSURE INFORMATION:** In order to assist in screening the accompanying international application for purposes of determining whether a license for foreign transmittal should and could be granted and for other purposes, the following information is supplied. (Note: check as many boxes as apply):

- A. ☐ The invention disclosed was not made in the United States.  
 B. ☐ There is no prior U.S. application relating to this invention.  
 C. ☒ The following prior U.S. application(s) contain subject matter which is related to the invention disclosed in the attached international application. (NOTE: priority to these applications may or may not be claimed on form PCT/RO/101 (Request) and this listing does not constitute a claim for priority.)

application no.	<b>10/764012</b>	filed on	<b>January 23, 2003</b>
application no.		filed on	

- D. ☐ The present international application contains additional subject matter not found in the prior U.S. application(s) identified in paragraph C. above. The additional subject matter is found on pages

and ☒ DOES NOT ALTER ☐ MIGHT BE CONSIDERED TO ALTER the general nature of the invention in a manner which would require the U.S. application to have been made available for inspection by the appropriate defense agencies under 35 U.S.C. 181 and 37 CFR 5.1. See 37 CFR 5.15.

**III. ☐ A Response to an Invitation from the RO/US. The following document(s) is (are) enclosed:**

- A. ☐ A Request for An Extension of Time to File a Response  
 B. ☐ A Power of Attorney (General or Regular)  
 C. ☐ replacement pages:

pages	of the request (PCT/RO/101)	Pages	of the figures
pages	of the description	pages	of the abstract
pages	of the claims		

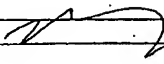
- D. ☐ Submission of Priority Documents

Priority document	Priority document
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- E. ☐ Fees as specified on attached Fee Calculation sheet form PCT/RO/101 annex

**IV. ☐ A Request for Rectification under PCT 91 ☐ A Petition ☐ A Sequence Listing Diskette**

**V. ☐ Other (please specify):**

The person signing this form is the:	<input type="checkbox"/> Applicant	<b>BRUCE D. GRAY, Reg. No. 35,799</b>
	<input checked="" type="checkbox"/> Attorney/Agent (Reg. No.)	Typed name of signer
	<input type="checkbox"/> Common Representative	 Signature

## PCT REQUEST

Original (for SUBMISSION)

0	For receiving Office use only	
0-1	International Application No.	
0-2	International Filing Date	
0-3	Name of receiving Office and "PCT International Application"	
0-4	Form - PCT/RO/101 PCT Request	
0-4-1	Prepared Using	PCT-SAFE [EASY mode] Version 3.50 (Build 0002.162)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	United States Patent and Trademark Office (USPTO) (RO/US)
0-7	Applicant's or agent's file reference	E0055-286676
I	Title of invention	FILLED POLYMER COMPOSITE AND SYNTHETIC BUILDING MATERIAL COMPOSITIONS
II	Applicant	
II-1	This person is:	applicant only
II-2	Applicant for	all designated States except US
II-4	Name:	CENTURY-BOARD USA LLC
II-5	Address:	9190 Butterfly Court Fort Myers, FL 33919 United States of America
II-6	State of nationality	US
II-7	State of residence	US
II-8	Telephone No.	(239) 454-4908
III-1	Applicant and/or inventor	
III-1-1	This person is:	applicant and inventor
III-1-2	Applicant for	US only
III-1-4	Name (LAST, First)	BROWN, Wade, H.
III-1-5	Address:	9190 Butterfly Court Fort Myers, FL 33919 United States of America
III-1-6	State of nationality	US
III-1-7	State of residence	US


## PCT REQUEST

Original (for SUBMISSION )

IV-1	Agent or common representative; or address for correspondence The person identified below is hereby/ has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name (LAST, First)	PRATT, John, S.
IV-1-2	Address:	1100 PEACHTREE STREET SUITE 2800 ATLANTA, GA 30309-4530 United States of America
IV-1-3	Telephone No.	404-815-6500
IV-1-4	Facsimile No.	404-815-6555
IV-1-6	Agent's registration No.	29,476
IV-2	Additional agent(s)	additional agent(s) with same address as first named agent
IV-2-1	Name(s)	GRAY, Bruce, D. (35,799)
V	DESIGNATIONS	
V-1	The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.	
VI-1	Priority claim of earlier national application	
VI-1-1	Filing date	23 January 2004 (23.01.2004)
VI-1-2	Number	10/764,012
VI-1-3	Country	US
VI-2	Priority document request The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1
VII-1	International Searching Authority Chosen	United States Patent and Trademark Office (USPTO) (ISA/US)

## PCT REQUEST

Original (for SUBMISSION )

VIII	Declarations	Number of declarations	
VIII-1	Declaration as to the identity of the inventor	-	
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	-	
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	-	
VIII-4	Declaration of Inventorship (only for the purposes of the designation of the United States of America)	-	
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	-	
IX	Check list	number of sheets	electronic file(s) attached
IX-1	Request (including declaration sheets)	4	✓
IX-2	Description	22	-
IX-3	Claims	5	-
IX-4	Abstract	1	✓
IX-5	Drawings	0	-
IX-7	TOTAL	32	
	Accompanying items	paper document(s) attached	electronic file(s) attached
IX-8	Fee calculation sheet	✓	-
IX-17	PCT-SAFE physical media	-	✓
IX-19	Figure of the drawings which should accompany the abstract		
IX-20	Language of filing of the International application	English	
X-1	Signature of applicant, agent or common representative		
X-1-1	Name (LAST, First)	GRAY, Bruce, D.	
X-1-2	Name of signatory		
X-1-3	Capacity		

## PCT REQUEST

Original (for SUBMISSION )

## FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported International application	
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported International application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/US
10-6	Transmittal of search copy delayed until search fee is paid	

## FOR INTERNATIONAL BUREAU USE ONLY

11-1	Date of receipt of the record copy by the International Bureau	
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CONFIDENTIAL

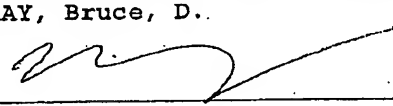
E0055-286676

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**PCT (ANNEX - FEE CALCULATION SHEET)**

Original (for SUBMISSION)

(This sheet is not part of and does not count as a sheet of the international application)

0	For receiving Office use only		
0-1	International Application No.		
0-2	Date stamp of the receiving Office		
0-4	Form PCT/RO/101 (Annex) PCT Fee Calculation Sheet		
0-4-1	Prepared Using	PCT-SAFE [EASY model] Version 3.50 (Build 0002.162)	
0-9	Applicant's or agent's file reference		E0055-286676
2	Applicant		CENTURY-BOARD USA LLC
12	Calculation of prescribed fees	fee amount/multiplier	Total amounts (USD)
12-1	Transmittal fee T	⇒	300
12-2-1	Search fee S	⇒	1000
12-2-2	International search to be carried out by	US	
12-3	International filing fee (first 30 sheets) I1	1134	
12-4	Remaining sheets	2	
12-5	Additional amount (X) I2	12	
12-6	Total additional amount	24	
12-7	I1 + I2 = I	1158	
12-12	EASY Filing reduction R	-81	
12-13	Total International filing fee (I-R) I	⇒	1077
12-14	Fee for priority document: Number of priority documents requested	1	
12-15	Fee per document (X) P	20	
12-16	Total priority document fee: P	⇒	20
12-17	TOTAL FEES PAYABLE (T+S+I+P)	⇒	2397
12-19	Mode of payment		cheque
12-20	Deposit account instructions The receiving Office		United States Patent and Trademark Office (USPTO) (RO/US)
12-20-2	Authorization to charge any deficiency or credit any overpayment in the total fees indicated above.		✓
12-21	Deposit account No.		11-0855
12-22	Date		21 January 2005 (21.01.2005)
12-23	Name and signature		GRAY, Bruce, D. 

CB02067  
CONFIDENTIAL

# FILLED POLYMER COMPOSITE AND SYNTHETIC BUILDING MATERIAL COMPOSITIONS

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The invention relates to composite compositions having matrices of polymer networks and dispersed phases of particulate and/or fibrous materials, which have excellent mechanical properties, rendering them suitable for use in load bearing applications, such as in building materials. The composites are stable to weathering, can be molded and colored to desired functional and aesthetic characteristics, and are environmentally friendly, since they can make use of recycled particulate or fibrous materials as the dispersed phase.

### 2. Description of Related Art

Polymeric composite materials that contain organic or inorganic filler materials have become desirable for a variety of uses because of their excellent mechanical properties, weathering stability, and environmental friendliness.

These materials can be are relatively low density, due to their foaming, or high density when unfoamed, but are extremely strong, due to the reinforcing particles or fibers used throughout. Their polymer content also gives them good toughness (i.e., resistance to brittle fracture), and good resistance to degradation from weathering when they are exposed to the environment. This combination of properties renders some polymeric composite materials very desirable for use in building materials, such as roofing materials, decorative or architectural products, outdoor products, insulation panels, and the like.

In addition, the filler materials used need not be virgin materials, and can desirably be recycled fibers or particulates formed as waste or by-product from industrial processes. Polymeric composites allow these materials to be advantageously reused, rather than present disposal problems.

Filled composite polymeric materials have been described in U.S. Patent Nos. 5,302,634; 5,369,147; 5,548,315; and 5,604,260, the contents of each of which is incorporated herein by reference. However, the materials disclosed in these patents all use polyester polyurethane resins that are formed as the reaction products of unsaturated polyester polyols, saturated polyols, poly- or di-isocyanates, and a reactive monomer, such as styrene. The number of different reactants, and the complexity of the resulting process chemistry, adds increased cost to the preparation of these materials, both through added costs for materials inputs and through added capital costs for additional process equipment.

A filled closed cell foam material is disclosed in U.S. Patent No. 4,661,533 (Stobby), but provides much lower densities than are desirable for structural building products. Moreover, Stobby does not disclose or suggest a composite material that is "self-skinning," i.e., that forms a continuous skin on the surface of the material that covers and protects the material underneath, which is porous, and subject to visible scratching.

#### SUMMARY OF THE INVENTION

It has been found, however, that a highly filled, foamed or unfoamed composite polymeric material having good mechanical properties can be obtained without the need for all of the components required in the patents cited above. This



results in a substantial decrease in cost, because of decreased materials cost, and because of decreased complexity of the process chemistry, leading to decreased capital investment in process equipment.

In one embodiment, the invention relates to composite compositions having a matrix of polymer networks and dispersed phases of particulate or fibrous materials. The polymer matrix contains a polyurethane network formed by the reaction of a poly- or di-isocyanate and one or more saturated polyether or polyester polyols, and an optional polyisocyanurate network formed by the reaction of optionally added water and isocyanate. The matrix is filled with a particulate phase, which can be selected from one or more of a variety of components, such as fly ash particles, axially oriented fibers, fabrics, chopped random fibers, mineral fibers, ground waste glass, granite dust, or other solid waste materials. The addition of water can also serve to provide a blowing agent to the reaction mixture, resulting in a foamed structure, if such is desired.

The composite material of the invention is advantageously used as structural building material, and in particular as synthetic lumber, for several reasons. First, it has the desired density, even when foamed, to provide structural stability and strength. Second, the composition of the material can be easily tuned to modify its properties by, e.g., adding oriented fibers to increase flexural stiffness, or by adding pigment or dyes to hide the effects of scratches. This can be done even after the material has been extruded. Third, the material is self-skinning, forming a tough, slightly porous layer that covers and protects the more porous material beneath. This tough, continuous, highly adherent skin provides excellent water and scratch

resistance. In addition, as the skin is forming, an ornamental pattern (e.g., a simulated wood grain) can be impressed on it, increasing the commercial acceptability of products made from the composite.

In a more specific embodiment, the invention relates to a polymer matrix composite material, comprising:

- (1) a polyurethane formed by reaction of
  - (a) one or more monomeric or oligomeric poly- or di-isocyanates;
  - (b) a first polyether polyol having a first molecular weight; and
  - (c) an optional second polyether polyol having a second molecular weight lower than the first molecular weight; and
- (2) optionally, a polyisocyanurate formed by reaction of a monomeric or oligomeric poly- or di-isocyanate with water or other blowing agents;
- (3) a particulate inorganic filler.

As indicated above, the polymer matrix composite material of the invention can have a variety of different uses. However, it is particularly suitable in structural applications, and in particular as an synthetic lumber. Accordingly, another specific embodiment of the invention relates to an synthetic lumber, comprising the polymer matrix composite material described above, and having a relatively porous material and a relatively non-porous toughening layer disposed on and adhered to the porous material.

It has been found that the process used to manufacture the polymer matrix composite material and the synthetic lumber formed therefrom can have an important impact on the appearance and properties of the resulting material, and thus on its

commercial acceptability. Accordingly, another particular embodiment of the invention relates to a method of producing a polymer matrix composite, by:

- (1) mixing a first polyether polyol having a first molecular weight and a second polyether polyol having a second molecular weight higher than the first molecular weight with a catalyst, optional water, and optional surfactant;
- (2) optionally introducing reinforcing fibrous materials into the mixture;
- (3) introducing inorganic filler into the mixture;
- (4) introducing poly- or di-isocyanate into the mixture; and
- (5) allowing the exothermic reaction to proceed without forced cooling except to control runaway exotherm.

The materials of the invention, and the process for their preparation, are environmentally friendly. They provide a mechanism for reuse of particulate waste in a higher valued use, as described above. In addition, the process for making them optionally uses water in the formation of polyisocyanurate, which releases carbon dioxide as the blowing agent. The process thus avoids the use of environmentally harmful blowing agents, such as halogenated hydrocarbons.

#### DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

As described above, one embodiment of the invention relates to a composite composition containing a polymeric matrix phase and a dispersed inorganic particulate phase, and which can contain other materials, such as reinforcing fibers, pigments and dyes, and the like. One of the desirable properties of the material is its self-skinning nature.

The polymeric phase desirably contains at least a polyurethane, generally considered to be a 2-part or thermosetting polyurethane. The polyurethane is formed by reacting a poly- or di-isocyanate (hereinafter "isocyanate"), particularly an aromatic diisocyanate, more particularly, a methylene diphenyl diisocyanate (MDI), with one or more polyether polyols, described in more detail below.

The MDI used in the invention can be MDI monomer, MDI oligomer, or a mixture thereof. The particular MDI used can be selected based on the desired overall properties, such as the amount of foaming, strength of bonding to the inorganic particulates, wetting of the inorganic particulates in the reaction mixture, strength of the resulting composite material, and stiffness (elastic modulus). Although toluene diisocyanate can be used, MDI is generally preferable due to its lower volatility and lower toxicity. Other factors that influence the particular MDI or MDI mixture used in the invention are viscosity (a low viscosity is desirable from an ease of handling standpoint), cost, volatility, reactivity, and content of 2,4 isomer. Color may be a significant factor for some applications, but does not generally affect selection of an MDI for preparing synthetic lumber.

Light stability is also not a particular concern for selecting MDI for use in the composite of the invention. In fact, the composite of the invention allows the use of isocyanate mixtures not generally regarded as suitable for outdoor use, because of their limited light stability. When used in the composite of the invention, these materials surprisingly exhibit excellent light stability, with little or no yellowing or chalking. Since isocyanate mixtures normally regarded as suitable for outdoor use (generally aliphatic isocyanates) are considerably more expensive than those used in

this invention, the ability of the invention to use MDI mixtures represents a significant cost advantage.

Suitable MDI compositions for use in the invention include those having viscosities ranging from about 25 to about 200 cp at 25 °C and NCO contents ranging from about 30% to about 35%. Generally, isocyanates are used that provide at least 1 equivalent NCO group to 1 equivalent OH group from the polyols, desirably with about 5 % to about 10% excess NCO groups. Suitable isocyanates include Bayer MRS-4, Bayer MR Light, Dow PAPI 27, Bayer MR5, Bayer MRS-2, and Rubinate 9415.

As indicated above, the isocyanate used in the invention is reacted with one or more polyols. In general, the ratio of isocyanate to polyol, based on equivalent weights (OH groups for polyols and NCO groups for isocyanates) is generally in the range of about 0.5:1 to about 1.5:1, more particularly from about 0.8:1 to about 1.1:1. Ratios in these ranges provide good foaming and bonding to inorganic particulates, and yields low water pickup, fiber bonding, heat distortion resistance, and creep resistance properties. However, precise selection of the desired ratio will be affected by the amount of water in the system, including water added per se as a foaming agent, and water introduced with other components as an "impurity."

The polyol or polyols used may be single monomers, oligomers, or blends. Mixtures of polyols can be used to influence or control the properties of the resulting polymer network. For example, mixtures of two polyols, one a low molecular weight, rubbery (relative to the second) polyol and the other a higher molecular weight, more rigid (relative to the first) polyol. The amount of rigid polyol is carefully controlled

in order to avoid making the composite too brittle(a ratio of flexible polyol to rigid polyol of between about 5 wt% and about 20 wt%, more particularly around 15 wt% has generally been found to be suitable. It is generally desirable to use polyols in liquid form, and generally in the lowest viscosity liquid form available, as these can be more easily mixed with the inorganic particulate material. So-called "EO" tipped polyols can be used; however their use is generally avoided where it is desired to avoid "frosting" of the polymer material when exposed to water.

In general, desirable polyols include polyether polyols, such as MULTRANOL (Bayer), including MULTRANOL 3400 or MULTRANOL 4035, ethylene glycol, diethylene glycol, triethylene glycol, dipropylene glycol, glycerol, 2-butyne-1,4-diol, neopentyl glycol, 1,2-propanediol, pentaerythritol, mannitol, 1,6-hexanediol, 1,3-bis(4-hydroxyphenyl)propane, hydrogenated bisphenol A, polytetramethyleneglycolethers, polythioethers, and other di- and multi-functional polyethers and polyester polyethers, and mixtures thereof. The polyols need not be miscible, but should not cause compatibility problems in the polymeric composite.

As indicated above, the composite of the invention can desirably be prepared by mixing the polyols together (if multiple polyols are used), and then mixing them with various additives, such as catalysts, surfactants, and foaming agent, and then adding the inorganic particulate phase, then any reinforcing fiber, and finally the isocyanate.

One or more catalysts are generally added to control the curing time of the polymer matrix (upon addition of the isocyanate), and these may be selected from among those known to initiate reaction between isocyanates and polyols, such as

amine-containing catalysts, such as DABCO and tetramethylbutanediamine, , tin-, mercury- and bismuth-containing catalysts, . To increase uniformity and rapidity of cure, it may be desirable to add multiple catalysts, including a catalyst that provides overall curing via gelation, and another that provides rapid surface curing to form a skin and eliminate tackiness. For example, a liquid mixture of 1 part tin-containing catalyst to 10 parts amine-containing catalyst can be added in an amount greater than 0 wt% and below about 0.10 wt% (based on the total reaction mixture) or less, depending on the length of curing time desired. Too much catalyst can result in overcuring, which could cause buildup of cured material on the processing equipment, or too stiff a material which cannot be properly shaped, or scorching; in severe cases, this can lead to unsaleable product or fire. Curing times generally range from about 5 seconds to about 2 hours.

A surfactant may optionally be added to the polyol mixture to function as a wetting agent and assist in mixing of the inorganic particulate material. The surfactant also stabilizes bubbles formed during foaming (if a foamed product is desired) and passivates the surface of the inorganic particulates, so that the polymeric matrix covers and bonds to a higher surface area. Surfactants can be used in amounts below about 0.5 wt%, desirably about 0.3 wt%, based on the total weight of the mixture. Excess amount of surfactant can lead to excess water absorption, which can lead to freeze/thaw damage to the composite material. Silicone surfactants have been found to be suitable for use in the invention. Examples include DC-197 and DC-193 (silicone-based, Air Products), and other nonpolar and polar (anionic and cationic) products.

Foaming agent may also be added to the polyol mixture if a foamed product is desired. While these may include organic blowing agents, such as halogenated hydrocarbons, hexanes, and other materials that vaporize when heated by the polyol-isocyanate reaction, it has been found that water is much less expensive, and reacts with isocyanate to yield  $\text{CO}_2$ , which is inert, safe, and need not be scrubbed from the process. Equally as important,  $\text{CO}_2$  provides the type of polyurethane cells desirable in a foamed product (i.e., mostly open, but some closed cells), is highly compatible with the use of most inorganic particulate fillers, particularly at high filler levels, and is compatible with the use of reinforcing fibers. Other foaming agents will not produce the same foam structure as is obtained with water.

If water is not added to the composition, some foaming may still occur due to the presence of small quantities of water (around 0.2 wt%, based on the total weight of the reaction mixture) introduced with the other components as an "impurity." On the other hand, excessive foaming resulting from the addition of too much water (either directly or through the introduction of "wet" reactants or inorganic particulate materials) can be controlled by addition of an absorbent, such as UOP "T" powder.

The amount of water present in the system will have an important effect on the density of the resulting composite material. This amount generally ranges from about 0.10 wt% to about 0.40 wt%, based on the weight of polyol added, for composite densities ranging from about 20 lb/ft<sup>3</sup> to about 90 lb/ft<sup>3</sup>.

Reinforcing fibers can also be introduced into the polyol mixture prior to introduction of the isocyanate. These can include fibers per se, such as chopped fiberglass, or fabrics or portions of fabrics, such as rovings or linear tows, or



combinations of these. Typically, the reinforcing fibers range from about 0.125 in. to about 1 in, more particularly from about 0.25 in to about 0.5 in. The reinforcing fibers give the material added strength (flexural, tensile, and compressive), increase its stiffness, and provide increased toughness (impact strength or resistance to brittle fracture). Fabrics, rovings, or tows increase flexural stiffness and creep resistance. The inclusion of the particular polyurethane networks of the invention, together with the optional surfactants, and the inorganic particulate sizes used make the composite of the invention particularly and surprisingly well suited for inclusion of reinforcing fibers in foamed material, which normally would be expected to rupture or distort the foam bubbles and decrease the strength of the composite system.

In addition to inclusion of reinforcing fibers into the polyol mixture prior to polymerization, oriented axial fibers can also be introduced into the composite after extrusion, as the polymer exits the extruder and prior to any molding. The fibers (e.g., glass strings) can desirably be wetted with a mixture of polyol (typically a higher molecular weight, rigid polyol) and isocyanate, but without catalyst or with a slow cure catalyst, or with other rigid or thermosetting resins, such as epoxies. This allows the wetted fiber to be incorporated into the composite before the newly added materials can cure, and allows this curing to be driven by the exotherm of the already curing polymer in the bulk material.

Whether added before or after polymerization and extrusion, the composite material of the invention contains a polymeric matrix phase that is strongly bonded to the dispersed reinforcing fibers, increasing the strength and stiffness of the resulting

material. This enables the material to be used as a structural synthetic lumber, even at relatively low densities (e.g., about 20 to about 60 lb/ft<sup>3</sup>).

Pigment or dye can be added to the polyol mixture or can be added at other points in the process. The pigment is optional, but can help make the composite material more commercially acceptable, more distinctive, and help to hide any scratches that might form in the surface of the material. Typical examples of pigments include iron oxide, typically added in amounts ranging from about 2 wt% to about 7 wt%, based on the total weight of the reaction mixture.

The inorganic particulate phase is an important feature of the invention, and is typically present in amounts ranging between about 45 wt% to about 85 wt% of the total composition. Increasing the proportion of inorganic particulate can lead to increased difficulty in mixing, making the inclusion of a surfactant more desirable. The inorganic particulate material should have less than about 0.5 wt% water (based on the weight of the particulate material) in order to avoid excessive or uncontrolled foaming.

It is generally desirable to use particulate materials with a broad particle size distribution, because this provides better particulate packing, leading to increased density and decreased resin level per unit weight of composite. Since the inorganic particulate is typically some form of waste or scrap material, this leads to decreased raw material cost as well. Particles having size distributions ranging from about 0.0625 in to below 325 mesh have been found to be particularly suitable

Suitable inorganic particulates can include ground glass particles, fly ash, bottom ash, sand, granite dust, and the like, as well as mixtures of these. Fly ash is

desirable because it is uniform in consistency, contains some carbon (which can provide some desirable weathering properties to the product due to the inclusion of fine carbon particles which are known to provide weathering protection to plastics, and the effect of opaque ash particles which block UV light., and contains some metallic species, such as metal oxides, which are believed to provide additional catalysis of the polymerization reactions. Ground glass (such as window or bottle glass) absorbs less resin, decreasing the cost of the composite. A 1:1 mixture of coal fly ash and bottom ash has also been found to be suitable as the inorganic particulate composition. In general, fly ash having very low bulk density (e.g., less than about 40 lb/ft<sup>3</sup>) and/or high carbon contents (e.g., around 20 wt% or higher) are less suitable; since they are more difficult to incorporate into the resin system, and may require additional inorganic fillers that have much less carbon, such as foundry sand, to be added. Fly ash produced by coal-fueled power plants, including Houston Lighting and Power power plants, fly and bottom ash from Southern California Edison plants (Navajo or Mohave), fly ash from Scottish Power/Jim Bridger power plant in Wyoming, and fly ash from Central Hudson Power plant have been found to be suitable for use in the invention.

The process for producing the composite material may be operated in a batch, semibatch, or continuous manner. Mixing may be conducted using conventional mixers, such as Banbury type mixers, stirred tanks, and the like, or may be conducted in an extruder, such as a twin screw, co-rotating extruder. When an extruder is used, additional heating is generally not necessary, especially if liquid polyols are used. In

addition, forced cooling is not generally required, except for minimal cooling to control excessive or runaway exotherms.

For example, a multi-zone extruder can be used, with polyols and additives introduced into the first zone, inorganic particulates introduced in the second zone, and chopped fibers, isocyanate, and pigments introduced in the fifth zone. A twin screw, co-rotating, extruder (e.g. 100 mm diameter, although the diameter can be varied substantially) can be used, with only water cooling (to maintain room temperature), and without extruder vacuum (except for ash dust). Liquid materials can be pumped into the extruder, while solids can be added by suitable hopper/screw feeder arrangements. Internal pressure build up in such an exemplary arrangement is not significant.

Although gelation occurs essentially immediately, complete curing can take as long as 48 hours, and it is therefore desirable to wait at least that long before assessing the mechanical properties of the composite, in order to allow both the composition and the properties to stabilize.

As explained above, the composite material of the invention is advantageously used in structural products, including synthetic lumber. The synthetic lumber may be formed in a batch, semibatch, or continuous fashion. For example, in continuous operation, polymerized (and polymerizing) material leaving the extruder (after optional incorporation of post-extruder fibers, tows, or rovings) is supplied to a forming system, which provides dimensional constraint to the material, and can be used to pattern the surfaces of the resulting synthetic lumber with simulated woodgrain or other designs, in order to make the material more commercially

desirable. For example, a conveyor belt system comprising 2, 4, or 6 belts made from a flexible resin having wood grain or other design molded therein can be used. One such suitable system is described in copending U.S. Patent Application Serial No. \_\_\_\_\_

(Attorney Docket No. \_\_\_\_\_) filed on even date herewith, the entire contents of which are incorporated herein by reference. Desirably, the belts are formed from a self-releasing rubber or elastomeric material so that it will not adhere to the polymer composite. Suitable belt materials include silicone rubber, oil impregnated polyurethane, or synthetic or natural rubbers, if necessary coated with a release agent, such as waxes, silicones, or fluoropolymers.

Representative suitable compositional ranges for synthetic lumber, in percent based on the total composite composition, are provided below:

Rigid polyol	about 6 to about 18 wt%
Flexible polyol	0 to about 10 wt%
Surfactant	about 0.2 to about 0.5 wt%
Skin forming catalyst	about 0.002 to about 0.01 wt%
Gelation catalyst	about 0.02 to about 0.1 wt%
Water	0 to about 0.5 wt%
Chopped fiberglass	0 to about 10 wt%
Pigments	0 to about 6 wt%
Inorganic particulates	about 60 to about 85 wt%
Isocyanate	about 6 to about 20 wt%
Axial tows	0 to about 6 wt%.

The invention can be further understood by reference to the following non-limiting examples.

#### EXAMPLE 1

A polymer composite composition was prepared by introducing 9.5 wt% rigid polyol (MULTRANOL 4035, Bayer), 0.3 wt% rubber polyol (ARCOL LG-56, Bayer), 0.3 wt% surfactant/wetting agent (DC-197, Air Products), 0.005 wt% film forming organic tin catalyst (UL-28/22, Air Products), 0.03 wt% amine gelation catalyst (33LV, Air Products), and 0.05 wt% water as foaming agent to the drive end of a 100 mm diameter twin screw co-rotating extruder with water cooling to maintain room temperature. At a point around 60% of the length of the extruder, 4.2 wt% chopped glass fibers (Owens Corning) with ¼ to 1/2 inch lengths were added, along with 4.0 wt% brown pigment (Interstar), 74 wt% fly ash (ISG), and 9.6 wt% isocyanate (MONDUR MR Light, Bayer). The extruder was operated at room temperature (75 °F), at 200 rpm for one hour. Following extrusion, 0.4 wt% of a resin mixture of rubbery polyol (ARCOL LG-56, Bayer), and isocyanate (MONDUR MR Light, Bayer) were added to the surface of the extruded material to provide a bonding adhesive for glass tows. The glass tows (Owens Corning) ¼ to ½ inch length were added in an amount of around 2 wt% to provide added rigidity, and were added just below the surface of the material produced by the extruder.

The resulting composite material was particularly useful as synthetic decking material.

#### EXAMPLE 2

In a batch reactor, 16.4 wt % rigid polyol (Bayer 4035) was combined with 1.9 wt% flexible polyol (Bayer 3900), 0.2 wt% surfactant (DC-197), water, 3.2 wt% pigments, 0.0001 wt% UL-28 organic tin catalyst, and 0.1 wt% 33LV amine catalyst, and thoroughly mixed for 1 minute. 31.5 wt% Wyoming fly ash was then added and mixed for an additional 1 minute. Finally, 17.3 wt% isocyanate (1468A, Hehr), 0.9 wt% chopped brown fiber, 3.5 wt% chopped glass (0.25 in. diameter), and an additional 25.2 wt% Wyoming fly ash were added and mixed for 30 seconds. The resulting material had a resin content of 36 %, a ratio of rigid to rubbery polyol of 90%, a solids content of 64%, a 10% excess isocyanate content, and a fiber content of 4.4%, all by weight based on the total composition unless noted otherwise. The resulting material was suitable for forming synthetic lumber boards.

### EXAMPLE 3

In a batch reactor, 16.4 wt % rigid polyol (Bayer 4035) was combined with 1.9 wt% flexible polyol (Bayer 3900), 0.2 wt% surfactant (DC-197), water, 3.2 wt% pigments, 3.5 wt% chopped glass (0.25 in. diameter), around 0.4 wt% Mohave bottom ash, 0.0001 wt% UL-28 organic tin catalyst, and 0.1 wt% 33LV amine catalyst, and thoroughly mixed for 1 minute. 31.5 wt% Wyoming fly ash was then added and mixed for an additional 1 minute. Finally, 17.3 wt% isocyanate (1468A, Hehr), 0.9 wt% chopped brown fiber, and an additional 25.2 wt% Wyoming fly ash were added and mixed for 30 seconds. The resulting material had a resin content of 36 %, a ratio of rigid to rubbery polyol of 90%, a solids content of 64%, a 10% excess isocyanate content, and a fiber content of 4.4%, all by weight based on the total

composition unless noted otherwise. The resulting material was suitable for forming synthetic lumber boards.

For each of Examples 2 and 3, water was added in amounts shown below (in percent based on total polyol added); physical properties of the resulting material were tested, and the results provided below. The 200 lb impact test was conducted by having a 200 lb man jump on an 18 inch span of synthetic lumber board, 2 x 6 inches, supported above the ground from a height of about 1 ft in the air, and evaluating whether the board breaks.



Example	H <sub>2</sub> O (% of polyol)	Density (lb/ft <sup>3</sup> )	Break Strength (psi)	100 psi Deflection (in)	Hardness (Durometer C)	Flexural Strength (psi)	Flexural Modulus (psi)	200 lb impact test (P/F)
2	0.10	63	730	0.15	62	3129	118,331	P
2	0.23	59	650	0.15	57	2786	118,331	P
2	0.40	47	450	0.15	52	1929	118,331	F
3	0.10	63	810	0.15	62	3472	118,331	P

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#### EXAMPLE 4

Fiberglass rovings (Ahlstrom, 0.755 g/ft) or brown basalt rovings (0.193 g/ft) were positioned in a 24 inch mold for 2 x 4 inch synthetic lumber, and stabilized to limit movement relative to the mold surface (about 0.125 in. in from the mold surface) and to keep them taut. The rovings were applied dry, coated and pre-cured with the synthetic lumber composition (minus ash and chopped glass), and wet with a mixture of 49 wt% rigid polyol (MULTRANOL 4035), 0.098 wt% surfactant (DC-197), 0.20 wt% amine catalyst (33LV), and 49.59 wt% isocyanate (Hehr 1468A).

To the mold was added a synthetic lumber mixture, formed by combining 16.6 wt% rigid polyol (MULTRANOL 4035), 5.5 wt% flexible polyol (MULTRANOL 3900), 0.16 wt% surfactant (DC-197), 0.07 wt% water, 3.7 wt% pigments, 0.003 wt% organic tin catalyst (UL-28, Air Products), and 0.1 wt% amine catalyst (33LV), and mixing for 1 minute, then adding 26.4 wt% Wyoming fly ash, mixing for 1 minute, and finally adding 20.4 wt% isocyanate (MRS4, Bayer), 1.1 wt% chopped brown fiber, 3.4 wt% chopped 0.25 in. fiberglass, and 22.5 wt% Wyoming fly ash, and mixing for 30 seconds.

The physical properties of the resulting boards were assessed, and are indicated below. Control boards were also prepared to different densities, and their physical properties evaluated as well. The axially oriented rovings greatly increased flexural strength, with little added weight. The rovings tend to have a more pronounced strengthening effect as the load on the material is increased.

Roving type	Number of rovings	Roving coating	Density (lb/ft <sup>3</sup> )	Flexural strength (psi)	Flexural Modulus @ 100 psi (Ksi)	Flexural Modulus @ 200 psi (Ksi)
Basalt	10	Dry	41	1191	73	53
Fiberglass	10	Pre-cured resin	58	4000	188	135
Fiberglass	10	Dry	62	5714	339	169
Basalt	40	Dry	49	2465	96	101
Basalt	40	Dry	31	1650	62	165
Fiberglass	10	Dry	32	2717	37	57
Fiberglass	10	Wet	36	3533	77	93
Fiberglass	5	Wet	36	2410	64	71
Fiberglass	15	Wet	38	4594	171	80
Fiberglass	20	Wet	35	4356	84	80
None			55	1808	147	98
None			66	4724	121	100
None			68	----	169	135
None			59	2568	70	84
None			45	1319	82	62
None			35	1174	56	63
None			41	746	59	0

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The synthetic lumber produced by the invention was found to have good fire retardant properties, achieving a flame spread index of 25, and to produce only small quantities of respirable particles of size less than 10  $\mu\text{m}$  when sawn. It provides excellent compressive strength, screw and nail holding properties, and density. Extruded composite of the invention generally provides mechanical properties that are even better than those provided by molded composite.

WHAT IS CLAIMED IS:

1. A polymer matrix composite material, comprising:
  - (1) a polyurethane formed by reaction of a reaction mixture, comprising:
    - (a) one or more monomeric or oligomeric poly- or di-isocyanates;
    - (b) a first polyol selected from the group consisting of polyether polyols and polyester polyols, having a first molecular weight; and
    - (c) an optional second polyol selected from the group consisting of polyether polyols and polyester polyols, having a second molecular weight lower than the first molecular weight; and
  - (2) an optional polyisocyanurate formed by reaction of a monomeric or oligomeric poly- or di-isocyanate with water which has been optionally added to the reaction mixture;
  - (3) an inorganic particulate material.
2. The polymer matrix composite material of claim 1, wherein the material is foamed.
3. The polymer matrix composite material of claim 1, further comprising one or more inorganic fibers disposed throughout the polymer matrix.
4. The polymer matrix composite material of claim 1, further comprising axially oriented fiber rovings disposed on, in, or beneath the surface of the composite.

5. The polymer matrix composite material of claim 1, wherein the second polyether polyol is present in an amount between 0 and about 20 wt% of the first polyether polyol.
6. The polymer matrix composite material of claim 1, wherein the inorganic particulate material is present in an amount ranging between about 45 wt% and about 80 wt%, based on the total weight of the composition.
7. The polymer matrix composite material of claim 1, wherein the inorganic particulate material is a fly ash, bottom ash, or particulate glass.
8. The polymer matrix composite material of claim 1, wherein the inorganic particulate material has a particle size distribution ranging from about 0.0625 in. to below about 325 mesh.
9. The polymer matrix composite material of claim 1, wherein the inorganic particulate material contains less than about 0.5 wt% water.
10. An synthetic lumber, comprising the polymer matrix composite material of claim 1;  
wherein the composite material comprises a relatively porous material and a relatively non-porous toughening layer disposed on and adhered to the porous material.

11. The synthetic lumber of claim 10, having a size and shape corresponding to that of commercially available lumber products.

12. The synthetic lumber of claim 11, wherein the synthetic lumber comprises at least on surface that has been embossed or impressed with a pattern.

13. The synthetic lumber of claim 13, wherein the pattern comprises a simulated wood grain.

14. A method of producing a polymer matrix composite, comprising:

(1) mixing a first polyether polyol having a first molecular weight and a second polyether polyol having a second molecular weight higher than the first molecular weight with one or more catalysts, water, and optional surfactant;

(2) optionally introducing reinforcing fibrous materials into the mixture;

(3) introducing inorganic filler into the mixture;

(4) introducing poly- or di-isocyanate into the mixture; and

(5) allowing the exothermic reaction to proceed without forced cooling except to control runaway exotherm, thereby forming a polymer matrix composite.

15. The method of claim 15, further comprising extruding the mixture or the polymer matrix composite through a die.

15  
16. The method of claim 16, wherein at least a portion of the mixing or reaction, or both occurs in an extruder.

17. The method of claim 15, further comprising molding the polymer matrix composite into a desired shape.

18. The method of claim 16, further comprising forming the polymer matrix composite into a synthetic lumber.

15  
19. The method of claim 19, wherein the forming comprises shaping the polymer matrix composite into a size and shape suitable for synthetic lumber.

15  
20. The method of claim 20, wherein the forming further comprises embossing or impressing at least one surface of the polymer matrix composite with a pattern.

21. The method of claim 15, wherein the one or more catalysts comprise a skin-forming catalyst.

15  
22. The method of claim 22, wherein the skin-forming catalyst comprises an organic tin compound.

23. The method of claim 15, wherein the one or more catalysts comprise a gelation catalyst.



24. The method of claim <sup>15</sup>24, wherein the gelation catalyst comprises an amine.

25. The method of claim 15, further comprising introducing axially oriented fiber rovings into the polymer matrix composite.

26. The method of claim <sup>15</sup>26, wherein the fiber rovings are introduced on, in, or beneath the surface of the composite.

## ABSTRACT OF THE DISCLOSURE

The invention relates to composite compositions having a matrix of polymer networks and dispersed phases of particulate or fibrous materials. The polymer matrix contains a polyurethane network formed by the reaction of a poly- or diisocyanate and one or more saturated polyether or polyester polyols, and an optional polyisocyanurate network formed by the reaction of optionally added water and isocyanate. The matrix is filled with a particulate phase, which can be selected from one or more of a variety of components, such as fly ash particles, axially oriented fibers, fabrics, chopped random fibers, mineral fibers, ground waste glass, granite dust, or other solid waste materials. The addition of water can also serve to provide a blowing agent to the reaction mixture, resulting in a foamed structure, if such is desired.

# Tab 6

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# TRANSMITTAL LETTER TO THE UNITED STATES RECEIVING OFFICE

Date **January 21, 2005**

International Application No. **NEW**

Attorney Docket No. **E0055/286677**

## I. Certification under 37 CFR 1.10 (if applicable)

**EV 3335198257 US**

Express Mail mailing number

**January 21, 2005**

Date of Deposit

I hereby certify that the application/correspondence attached hereto is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 FR 1.10 on the date indicated above and is addressed to Mail Stop PCT, Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450.

Signature of Person mailing correspondence

**KATHLEEN BENNETT**

Typed or printed name of person mailing correspondence

## II ☐ New International Application

TITLE **CONTINUOUS FORMING SYSTEM UTILIZING UP TO SIX ENDLESS BELTS**

Earliest priority date  
(Day/Month/Year)

**January 23, 2004**

SCREENING DISCLOSURE INFORMATION: In order to assist in screening the accompanying international application for purposes of determining whether a license for foreign transmittal should and could be granted and for other purposes, the following information is supplied. (Note: check as many boxes as apply):

- A. ☐ The invention disclosed was not made in the United States.  
B. ☐ There is no prior U.S. application relating to this invention.  
C. ☒ The following prior U.S. application(s) contain subject matter which is related to the invention disclosed in the attached international application. (NOTE: priority to these applications may or may not be claimed on form PCT/RO/101 (Request) and this listing does not constitute a claim for priority.)

application no.	<b>10/764013</b>	filed on	<b>January 23, 2003</b>
application no.		filed on	

D. ☐ The present international application contains additional subject matter not found in the prior U.S. application(s) identified in paragraph C. above. The additional subject matter is found on pages **1-10**

and ☒ DOES NOT ALTER ☐ MIGHT BE CONSIDERED TO ALTER the general nature of the invention in a manner which would require the U.S. application to have been made available for inspection by the appropriate defense agencies under 35 U.S.C. 181 and 37 CFR 5.1. See 37 CFR 5.15.

## III. ☐ A Response to an Invitation from the RO/US. The following document(s) is (are) enclosed:

- A. ☐ A Request for An Extension of Time to File a Response  
B. ☐ A Power of Attorney (General or Regular)  
C. ☐ replacement pages:

pages	of the request (PCT/RO/101)	Pages	of the figures
pages	of the description	pages	of the abstract
pages	of the claims		

- D. ☐ Submission of Priority Documents

Priority document	Priority document
-------------------	-------------------

- E. ☐ Fees as specified on attached Fee Calculation sheet form PCT/RO/101 annex

## IV. ☐ A Request for Rectification under PCT 91 ☐ A Petition ☐ A Sequence Listing Diskette

## V. ☐ Other (please specify):

The person  
signing this  
form is the:

- ☐ Applicant  
☒ Attorney/Agent (Reg. No.)  
☐ Common Representative

**BRUCE D. GRAY, Reg. No. 35,799**

Typed name of signer

Signature

E0055/286677

1/4

## PCT REQUEST

Original (for SUBMISSION)

0	For receiving Office use only	
0-1	International Application No.	
0-2	International Filing Date	
0-3	Name of receiving Office and "PCT International Application"	
0-4	Form - PCT/RO/101 PCT Request	
0-4-1	Prepared Using	PCT-SAFE [EASY mode] Version 3.50 (Build 0002.162)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	United States Patent and Trademark Office (USPTO) (RO/US)
0-7	Applicant's or agent's file reference	E0055/286677
I	Title of invention	CONTINUOUS FORMING SYSTEM UTILIZING UP TO SIX ENDLESS BELTS
II	Applicant	
II-1	This person is:	applicant only
II-2	Applicant for	all designated States except US
II-4	Name:	CENTURY-BOARD USA LLC
II-5	Address:	9190 Butterfly Court Fort Myers, FL 33919 United States of America
II-6	State of nationality	US
II-7	State of residence	US
II-8	Telephone No.	(239) 454-4908
III-1	Applicant and/or inventor	
III-1-1	This person is:	applicant and inventor
III-1-2	Applicant for	US only
III-1-4	Name (LAST, First)	BROWN, Wade, H.
III-1-5	Address:	9190 Butterfly Court Fort Myers, FL 33919 United States of America
III-1-6	State of nationality	US
III-1-7	State of residence	US

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## PCT REQUEST

Original (for SUBMISSION)

III-2	Applicant and/or inventor	
III-2-1	This person is:	applicant and inventor
III-2-2	Applicant for	US only
III-2-4	Name (LAST, First)	TAYLOR, Zachary
III-2-5	Address:	5530 Vista Cantora Yorba Linda, CA 92887 United States of America
III-2-6	State of nationality	US
III-2-7	State of residence	US
IV-1	Agent or common representative; or address for correspondence The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name (LAST, First)	PRATT, John, S.
IV-1-2	Address:	1100 PEACHTREE STREET SUITE 2800 ATLANTA, GA 30309-4530 United States of America
IV-1-3	Telephone No.	404-815-6500
IV-1-4	Facsimile No.	404-815-6555
IV-1-6	Agent's registration No.	29,476
IV-2	Additional agent(s)	additional agent(s) with same address as first named agent
IV-2-1	Name(s)	GRAY, Bruce, D. (35,799)
V	DESIGNATIONS	
V-1	The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.	
VI-1	Priority claim of earlier national application	
VI-1-1	Filing date	23 January 2004 (23.01.2004)
VI-1-2	Number	10/764,013
VI-1-3	Country	US
VI-2	Priority document request The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1


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## PCT REQUEST

Original (for SUBMISSION)

VII-1	International Searching Authority Chosen	United States Patent and Trademark Office (USPTO) (ISA/US)	
VIII	Declarations	Number of declarations	
VIII-1	Declaration as to the identity of the inventor	-	
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	-	
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	-	
VIII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	-	
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	-	
IX	Check list	number of sheets	electronic file(s) attached
IX-1	Request (including declaration sheets)	4	✓
IX-2	Description	11	-
IX-3	Claims	7	-
IX-4	Abstract	1	✓
IX-5	Drawings	6	-
IX-7	TOTAL	29	
	Accompanying items	paper document(s) attached	electronic file(s) attached
IX-8	Fee calculation sheet	✓	-
IX-17	PCT-SAFE physical media	-	✓
IX-19	Figure of the drawings which should accompany the abstract	1	
IX-20	Language of filing of the international application	English	
X-1	Signature of applicant, agent or common representative		
X-1-1	Name (LAST, First)	GRAY, Bruce, D.	
X-1-2	Name of signatory		
X-1-3	Capacity		

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E0055/286677

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**PCT REQUEST**

Original (for SUBMISSION)

**FOR RECEIVING OFFICE USE ONLY**

10-1	Date of actual receipt of the purported international application	
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/US
10-6	Transmittal of search copy delayed until search fee is paid	

**FOR INTERNATIONAL BUREAU USE ONLY**

11-1	Date of receipt of the record copy by the International Bureau	
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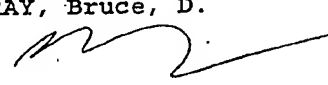
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**PCT (ANNEX - FEE CALCULATION SHEET)**

Original (for SUBMISSION)

(This sheet is not part of and does not count as a sheet of the international application)

0	For receiving Office use only		
0-1	International Application No.		
0-2	Date stamp of the receiving Office		
0-4	Form PCT/RO/101 (Annex) PCT Fee Calculation Sheet Prepared Using		PCT-SAFE [EASY mode] Version 3.50 (Build 0002.162)
0-9	Applicant's or agent's file reference		E0055/286677
2	Applicant		CENTURY-BOARD USA LLC
12	Calculation of prescribed fees		fee amount/multiplier      Total amounts (USD)
12-1	Transmittal fee	T	⇒ 300
12-2-1	Search fee	S	⇒ 1000
12-2-2	International search to be carried out by	US	
12-3	International filing fee (first 30 sheets)	I1	1134
12-4	Remaining sheets	0	
12-5	Additional amount	(X) 0	
12-6	Total additional amount	I2	0
12-7	I1 + I2 =	I	1134
12-12	EASY Filing reduction	R	-81
12-13	Total International filing fee (I+R)	I	⇒ 1053
12-14	Fee for priority document		
	Number of priority documents requested	1	
12-15	Fee per document	(X) 20	
12-16	Total priority document fee:	P	⇒ 20
12-17	TOTAL FEES PAYABLE (T+S+I+P)		⇒ 2373
12-19	Mode of payment		cheque
12-20	Deposit account Instructions The receiving Office		United States Patent and Trademark Office (USPTO) (RO/US)
12-20-2	Authorization to charge any deficiency or credit any overpayment in the total fees indicated above.		✓
12-21	Deposit account No.		11-0855
12-22	Date		21 January 2005 (21.01.2005)
12-23	Name and signature		GRAY, Bruce, D. 

**CONTINUOUS FORMING SYSTEM UTILIZING UP  
TO SIX ENDLESS BELTS**

*Not the  
final  
appl.  
(error.)*

**BACKGROUND OF THE INVENTION**

1. Field of the Invention

The invention relates to methods and systems for imparting desired shape and surface characteristics to a moldable or pliable material as the material cures or hardens. It is particularly applicable to the shaping and embossing of thermosetting resin systems during curing, and can be used to form these resin systems into a variety of products, including synthetic lumber, roofing, and siding.

2. Description of Related Art

Various techniques exist for continuously forming a soft or moldable material while it hardens or cures. For example, conveyor belts can be used to provide continuous support and movement for materials, and in some cases the belt faces may be contoured or profiled to mold the surfaces of the material and to impart a shape, feature, or surface appearance to the material. Two or more such belts may be configured to operate with the belt surfaces opposed and the material to be molded or shaped disposed between them. These systems can form fairly detailed three-dimensional products.

However, when such systems are used to form a foamed product, the structure of the overall system must be sufficiently strong to contain the pressure of the expanding foam. The longer the forming system and the larger the cross-section of the product to be formed, the greater the total force due to pressure and friction that the system must contain and overcome. As a result, in general, belt systems have not been thought to be suitable for formation of resin systems that involve foaming of the polymer matrix.

Forming systems have been developed to produce large rectangular polyurethane foam buns; these systems typically contain the foaming material within roller-supported films or sheets. The many rollers used in these systems contain the

increase in pressure due to foaming, and also help to minimize system friction. However, these systems are generally not able to mold detail or texture into the product surface.

Pullers are two-belted machines designed to grip and pull an extruded profile. As indicated above, conventional two-belt systems, such as pullers that utilize thick profiled belts, may be configured to continuously mold detail and texture into a product. However, these forming systems typically require profiled belts with relatively thick sidewall cross sections. The thick sidewalls minimize deflection of the unsupported sides of the mold-belt, thereby maintaining the intended product shape, and limiting extrusion of material through the resultant gap between belts. The thickness of the product formed by a conventional two-belt system is thus limited in practice by the thickness and width of the profiled mold-belts. Thicker belts needed to form products with deeper profiles require larger diameter end pulleys in order to prevent excessive bending, stretching, and premature breakage of the mold material.

In addition, most pullers are relatively short (6 feet or less). These short forming systems tend to require slower production speeds, allowing the product enough time in-mold to harden sufficiently before exiting the forming unit. Longer two-belt machines can be made, but in order to manage belt/belt friction these longer systems typically require the use of rollers to support the back of the profiled belts. Roller supported mold-belts tend to allow the mold faces to separate between rollers where the belts are unsupported, allowing material to leak between belt faces.

To continuously mold larger foamed cross-sections and to impart irregular shape or surface detail to the product, table-top conveyors are frequently used. Table-top conveyors use segmented metal mold sections attached to a metal chain-type conveyor. Two table-top conveyors are typically arranged face-to-face when used in this type of application, providing a rigid continuous mold. Preventing material from migrating into the joints between adjacent mold sections can be problematic for this type of forming system and may require the use of plastic films disposed between the mold and material to prevent leaks. In addition, such table-top conveyor systems are complex and costly.

Because of the various difficulties and deficiencies described above for existing forming systems, there remains a need in the art for a low cost forming system that can shape a curing polymer system, and in particular a foaming polymer system, without leaking. There is a need for such a system that can impart surface patterns and designs to the curing material, and that has sufficiently low friction and thickness that it can be practically made long enough to allow sufficient curing time in the system.

### SUMMARY OF THE INVENTION

The invention disclosed in this application is a new type of forming system utilizing up to six belts. The forming system is uniquely suited to the continuous forming of a range of product sizes with intricate molded-in detail. Material that may be formed using the described system include but are not limited to: thermoplastic and thermoset plastic compounds, highly-filled plastic compounds, elastomers, ceramic materials, and cementitious materials. The system is particularly suited to the forming of foamed materials. The material to be formed may be poured, dropped, extruded, spread, or sprayed onto or into the forming system.

In one embodiment, the invention relates to a system for providing shape, surface features, or both, to a moldable material, the system having:

- at least two first opposed flat endless belts disposed a first distance apart from each other, each having an inner surface and an outer surface;

- at least two second opposed flat endless belts disposed substantially orthogonal to the first two opposed endless belts and a second distance apart from each other, and each having an inner surface and an outer surface;

- a mold cavity defined at least in part by the inner surfaces of at least two of the opposed flat endless belts; and

- a drive mechanism for imparting motion to at least two of the opposed flat endless belts.

In a more particular embodiment, the invention relates to a forming system having 4 flat belted conveyors configured so as to define and enclose the top, bottom,

and sides of a 4-sided, open-ended channel, and an additional two profiled mold-belts that are configured to fit snugly, face-to-face within the channel provided by the surrounding flat belts. All belts are endless and supported by pulleys at the ends of their respective beds so as to allow each belt to travel continuously about its fixed path.

In another embodiment, the invention relates to a method of continuously forming a moldable material to have a desired shape or surface feature or both, comprising:

- introducing the moldable material into an end of a mold cavity formed at least in part by the inner surfaces of two substantially orthogonal sets of opposed flat belts;
- exerting pressure on the moldable material through the opposed flat belts;
- transferring the moldable material along the mold cavity by longitudinal movement of the belts;

- after sufficient time for the material to cure or harden into the molded configuration and thereby form molded material, removing the molded material from the mold cavity.

The system and method are versatile, permitting the production of a range of product sizes and profiles using the same machine. In an exemplary embodiment, the system and method provide for the continuous forming of synthetic lumber, roofing tiles, molded trim profiles, siding or other building products from heavily-filled, foamed thermoset plastic compounds and/or foamed ceramic compounds with organic binders.

### **BRIEF DESCRIPTION OF DRAWINGS**

FIG. 1A is a top plan view, FIG. 1B is a side plan view, and FIG. 1C is an end plan view of one embodiment of a system of the invention.

FIG. 2 is a partially expanded isometric view of one end of the system illustrated in FIG. 1.

FIG. 3A is an end plan view of one embodiment of the system of the invention. FIG. 3B is an exploded sectional view of the system of FIG. 3A.

FIG. 4 is a sectional view of a profile mold belt used in certain embodiments of the system of the invention.

FIG. 5 is a partial sectional, partial end plan view of a four belt configuration of the system of the invention.

FIG. 6 is a sectional view of a configuration of the system of the invention using drive belts and supporting the sides of the mold belts with pressurized air.

### **DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS**

For clarity of understanding, the invention will be described herein with respect to a single apparatus. It should be understood, however, that the invention is not so limited, and the system and method of the invention may involve two or more such systems operated in series or in parallel, and that a single system may contain multiple sets of belts, again operated in series or in parallel.

#### **Flat-Belted Conveyor Channel**

Each set of opposed flat belt conveyors are oriented so that their bearing surfaces face each other. One set of opposed flat belts can be thought of as "upper" and "lower" belts, although these descriptors are not limiting, nor do they require that the two opposed belts be horizontal. In practice, however, one set of opposed belts (the upper and lower belts) will be substantially horizontal. These belts can define the upper and lower surfaces of a mold cavity (when the device is operated in four-belt mode), or may provide support and drive surfaces for a set of opposed profile mold belts (when the device is operated in six-belt mode). The remaining set of opposed flat belts are disposed substantially orthogonal to the first set. As used herein, the term "substantially orthogonal" means close to perpendicular, but allowing for some deviation from 90° resulting from adjustment of the device, variations from level in the manufacturing floor, etc. This substantially orthogonal arrangement is accomplished in two basic configurations.

The first exemplary configuration involves disposing the flat bearing surfaces of the second set of belts along the sides of the space formed by the first set of belts, thereby forming an open-ended mold cavity that is enclosed by flat belts, and having a length corresponding to the length of the "side" belts. This configuration is

illustrated in FIG. 5. FIG. 1A provides a top view, FIG. 1B a side view, and FIG. 1C an end view, of a system 2 having upper flat belt 4, lower flat belt 4', upper profile mold belt 6, lower profile mold belt 6', and side belts 8 and 8'. These side belts extend longitudinally approximately the same distance as the upper and lower flat belts, providing a mold cavity that is supported from the side over virtually the entire length of the profile mold belts. Profile mold belts 6 and 6' are maintained in tension by tensioning rolls 10. Flat belts 4 and 4' are powered by driven rollers 12 and 12'.

The arrangement of belts and the corresponding rollers for this exemplary configuration can be seen in more detail in FIG. 2, which is a partially expanded view, wherein the upper flat belt 4, upper profile mold belt 6, and corresponding supports and rollers 10 and 12, have been lifted away from the remainder of the system for ease of visualization. Side belts 8, 8' are supported by side belt supports 14 and 14', and can run on side belt support rollers 16, 16'. These side belt support rollers are powered, or unpowered, as illustrated in FIG. 2. In addition, upper and lower flat belts 4 and 4' are supported by rigid supporting surfaces, such as platens 18, 18'.

As mentioned above, each flat belt is supported by a slider-bed or platen comprised of a rigid metal plate or other rigid supporting surface, if the length of the belt makes such support necessary or desirable. Generally, in order to provide sufficient curing time for filled polyurethane foams, a support surface is desirable but not required. The surface of the slider-bed in one embodiment has a slippery coating or bed-plate material attached or bonded to it (for example, ultra-high molecular weight polyethylene, PTFE, or other fluoropolymer). Also, the belt has a slippery backing material (for example, ultra-high molecular weight polyethylene, PTFE or other fluoropolymer) to reduce friction between the bed and moving belt in an exemplary embodiment.

To further reduce friction and enhance cooling of the belts and conveyor machinery, the slider-beds and attached slippery surface material of a conveyor has a plurality of relatively small holes drilled through the surface. These holes are in fluid communication with a source of compressed gas, such as air. As an example, a

plenum chamber is provided behind each slider bed, which is then connected to a source of pressurized air. Pressurized air fed into each plenum passes through the holes in the bed, and provides a layer of air between the bed and the adjacent belt. This air film provides lubrication between the bed and adjacent belt as shown in FIG. 2., where compressed air is supplied to the plenums through openings 20, 20'. The air fed into the plenums has a pressure higher than the foaming pressure of the product to be useful in reducing operating friction. In one embodiment, shop air or high-pressure blowers are used to provide the pressurized air to feed the plenums.

In a more particular exemplary embodiment, shown in FIG. 6, air supply plenums are also used to provide support to the sides of the mold belts, either directly (shown) or through side belts (not shown). In FIG. 6, flat belts 4 and 4' are supported by upper and lower air supply plenums 32 and 32', respectively. Areas of contact between the belts and the plenums are prepared from or coated with a low-friction substance, such as PTFE, or are lubricated to lower the friction between the belts and the supporting surfaces. Pressurized air 34 is supplied to these plenums through openings 36, 36', and exits the plenums through openings 38, 38', where it flows under and supports flat belts 4, 4', which in turn support the upper and lower surfaces of profile mold belts 6, 6'. In addition, pressurized air 40 enters side plenums 42, 42' through openings 44, 44'. The air leaves these side plenums through opening 46, 46', and flows against and supports the sides of profile mold belts 6, 6'. This support can result either from the air flow impinging directly on the sides of the mold belts, or from air flow impinging on the surfaces of side belts that in turn press against the sides of the profile mold belts. The profile mold belts, in turn, provide support to the material being formed, 48.

The flat-belts are powered and driven at matching speeds with respect to one another. The matched speed are achieved, in one embodiment, by mechanical linkage between the conveyors or by electronic gearing of the respective motors. Alternatively, as illustrated in FIG. 1 and 2, only two flat belts are driven (for example, the two opposing belts with greater contact area, which are typically the upper and lower belts) with the remaining two flat belts (for example, the side belts)



un-driven and idling. The flat-belts form a relatively rigid moving channel through which contoured mold-belts and/or forming product is moved and contained.

The driven flat-belts utilize known driven roller technologies, including center-drive pulley mechanisms, whereby more than 180° of contact is maintained between each conveyor's driving pulley and belt, increasing the amount of force that may be delivered to the belt.

In another exemplary configuration, the side flat belts are disposed substantially orthogonal relative to the upper and lower flat belts such that their bearing surfaces face each other, and are in a plane substantially perpendicular to the plane of the bearing surfaces of the upper and lower belts, as illustrated in FIG. 3. FIG. 3A is an end view with the corresponding drive and support apparatus removed for ease of viewing. FIG. 3A shows side flat belts 8 and 8' disposed between upper flat belt 4 and lower flat belt 4'. An expanded sectional view of this exemplary configuration is provided in FIG. 3B. The frames 22 and 22' supporting the side belts are restrained in such a way as to allow the position of the side flat belts to be adjusted laterally providing the desired degree of pressure against the sides of profile mold belts 6 and 6' or to accommodate mold belts of alternate widths. This configuration provides a relatively short, but highly contained mold cavity 24.

#### **Mold-Belts**

The contoured mold-belts are relatively thick belts with a rubbery face material attached to a fiber-reinforced backing or carcass as shown in Figure 4. The profile mold belt 6' is constructed to contain an inner surface 25, that defines part of mold cavity 24. It also has side surfaces 26, which contact side flat belts 8, 8', and outer surface 30, which contacts the inner surface of flat belt 4'. The fiber-reinforcement 28 in the backing of the belts will provide the strength and rigidity in the belt while the face material has the profile, surface features, and texture that is molded into the product. The desired mold profile, surface features, and texture are machined, cut, bonded, and/or cast into the surface of the mold-belts. The mold cavity created by the mold belts has a constant, irregular, and/or segmented cross-section. Multiple cavities can be incorporated into a single set of mold belts. Suitable

mold surface materials include, but are not restricted to Nitrile, Neoprene, polyurethane, silicone elastomers, and combinations thereof. Suitable fibers for reinforcing the profile mold belt include cotton, aramid, polyester, nylon, and combinations thereof.

Each profile mold-belt travels beyond the ends of the surrounding flat-belt conveyors to a separate set of large pulleys or rollers that maintain tension and the relative position of each belt. In one embodiment, the mold-belts are un-powered, functioning as idlers or slave belts to the powered flat belts behind them. In another embodiment, the mold belts are separately powered.

The temperature of the mold belts can be adjusted during production in the event that additional heat is needed or surplus heat is to be removed. If the temperature of the belt surface is adjusted, temperature controlled air is blown onto the belt surfaces as the belts exit the flat-belted conveyor enclosure and follow their return path to the entrance of the forming machine. In one embodiment, infrared or other radiant heaters are used to increase the temperature of the mold surface. In another embodiment, temperature controlled air or other fluid is routed through the conveyor frames to maintain predetermined process temperatures.

#### **Orientation**

As described above, the exemplary orientation of the forming system is for the contact surface between mold-belts to be horizontal. The gap between the upper and lower flat-belted conveyors (those conveyors adjacent to the backs of the mold-belts), can be precisely maintained such that the pair of mold-belts pass between them without being allowed to separate (presenting a gap to the molding material) and without excessively compressing the mold-belt shoulders or side walls. In the exemplary embodiment, the upper conveyor is removable while not in operation in order to permit replacement of the mold belts.

#### **Side Conveyors**

The flat-belted conveyors adjacent to the sides of the profile mold belts provide structural support for the sides of the mold cavity, resist any deflection of the sides due to foaming pressure, and maintain alignment of the mold-belts. These side-

supporting conveyors permit the use of thinner mold-belt sidewalls, which reduces the cost and mass of the mold-belts. The use of these side-supporting conveyors also permits the molding of deeper product cross sections without requiring excessive mold-belt widths.

### **System Versatility**

An exemplary configuration for the flat-belted conveyors is for the top and bottom conveyors to be wide, with the side conveyors sized to fit between the belts of the upper and lower conveyors in such a way that the surface of the upper and lower (wide) belts approach or make contact with the edges of the side belts. The frames, pulleys, and slider-beds of the side conveyors are slightly narrower than their respective belts to avoid contact with the upper and lower belts. A cross section of this exemplary configuration is shown in Figure 3B as described above. With this orientation, the gap between the side conveyors is adjustable in order to accommodate wider or narrower pairs of mold-belts. This configuration permits a range of product widths to be produced by the same forming machine. Only the mold-belt set is replaced in order to produce product of a different width.

To further increase the versatility of the forming machine, the side conveyor belts, pulleys, and slider beds are replaced with taller or shorter components and the gap between upper and lower conveyors adjusted accordingly. This feature permits the forming machine to accommodate mold-belts of various depths to produce thicker or thinner cross sections.

### **Four-Belt Mode**

The specific exemplary embodiments described above with respect to the drawings generally relate to configuration of the system in "six belt mode." In other words, an upper and lower flat belt, two side flat belts, and an upper and lower profile mold belt. The mold belts permit surface details, corner radii, irregular thicknesses, and deeper surface texture to be molded into the continuously formed product. However, for rectangular or square cross-sectioned products that do not require corner radii, deep texture, or localized features, the forming system is used without mold-belts, and operated in "four belt mode." In this exemplary operating configuration the

four flat belts make direct contact with the moldable product and permits the product to form within the flat-sided cavity. When the forming system is used in this configuration it is important that the upper and lower belts maintain contact with the edges of the side belts to prevent seepage of the material between adjacent belts. In order to produce thicker or thinner products in "four belt mode" the side flat belts, adjacent slider beds, and side belt pulleys are replaced with components in the target thickness. The gap between side belts is adjusted to accommodate the target width. Using this approach a large variety of four-sided cross-sections can be produced by the same machine without the added cost of dedicated mold-belts.

The four belt configuration is illustrated in FIG. 5. The sectional portion of the drawing shows that the mold cavity 24 is formed by the surfaces of upper and lower flat belts 4, 4' and the surfaces of side belts 8, 8'.

### FABRICATION

The forming system structure may be fabricated using metal materials and typical metal forming and fabricating methods such as welding, bending, machining, and mechanical assembly.

The forming system is used to form a wide variety of moldable materials, and has been found to be particularly suitable for forming synthetic lumber.

Although the descriptions above describe many specific details they should not be construed as limiting the scope of the invention or the methods of use, but merely providing illustration of some of the presently preferred embodiments of the invention.

WHAT IS CLAIMED IS:

1. A system for providing shape, surface features, or both, to a moldable material, comprising:
  - at least two first opposed flat endless belts spaced apart a first distance, each having an inner surface and an outer surface;
  - at least two second opposed flat endless belts disposed substantially orthogonal to the first two opposed endless belts and spaced apart a second distance,
  - a mold cavity defined at least in part by the inner surfaces of the at least two opposed flat endless belts; and
  - a drive mechanism for imparting motion to at least two of the opposed flat endless belts.
2. The system of claim 1, further comprising at least two endless opposing profile mold belts, each adapted to fit within the mold belt cavity, and each having
  - an inner surface adapted to shape, or mold surface features, or both, into a moldable material, and
  - an outer surface in contact with the inner surfaces of the flat endless belts.
3. The system of claim 1, wherein the outer surface of one or both of the flat endless belts is supported by a rigid supporting surface.
4. The system of claim 3, wherein the rigid supporting surface comprises a slider bed or platen.
5. The system of claim 3, wherein the outer surface comprises a coating of a friction reducing substance.

6. The system of claim 5, wherein the friction reducing substance comprises a fluoropolymer, ultra-high molecular weight polyethylene, or other low friction polymer.
7. The system of claim 3, further comprising an air-film lubrication system adapted to reduce friction between the flat endless belt and the rigid supporting surface.
8. The system of claim 7, wherein the rigid supporting surface comprises a plurality of holes therein, in fluid communication with a plenum chamber located near the slider bed or platen, and wherein the holes and plenum chamber are adapted to provide pressurized air film lubrication between the flat endless belt and the rigid supporting surface.
9. The system of claim 1, wherein the first opposed endless belts or the second opposed endless belts, or both, are adjustable such that the first distance, or the second distance, or both, can be varied.
10. The system of claim 1, wherein at least one of the profile mold belts comprise an elastomeric face layer adapted to contact the moldable material, and a reinforced backing layer adapted to contact the inner surface of the flat endless belt.
11. The system of claim 1, further comprising a plurality of a profile mold belt tensioners, adapted to maintain the profile mold belts in tension.
12. The system of claim 11, wherein the profile mold belt tensioner comprises one or more pulleys disposed such that the profile mold belt encloses at least a portion of the drive mechanism.

13. The system of claim 2, wherein the flat endless belts and the profile mold belts are oriented substantially horizontally, and wherein the additional opposed flat endless belts disposed substantially orthogonal to the first two opposed endless belts are disposed substantially vertically.

14. A method of continuously forming a moldable material to have a desired shape or surface feature or both, comprising:

introducing the moldable material into an end of a mold cavity formed at least in part by the inner surfaces of two substantially orthogonal sets of opposed flat belts;  
exerting pressure on the moldable material through the opposed flat belts;  
transferring the moldable material along the mold cavity by longitudinal movement of the belts;

after sufficient time for the material to cure or harden into the molded configuration and thereby form molded material, removing the molded material from the mold cavity.

15. The method of claim 14, wherein the mold cavity is at least partly defined by the inner surfaces of two opposed profiled mold belts disposed inside the opposed flat belts, and having outer surfaces in contact with the inner surfaces of two of the opposed flat belts.

16. The method of claim 14, wherein the moldable material comprises a filled thermoset plastic.

17. The method of claim 14, wherein the moldable material comprises a foamed or foaming material.

18. The method of claim 15, wherein the profile mold belts form the moldable material into a shape having a cross-section at least approximately corresponding to that of the mold cavity.

19. The method of claim 15, wherein the profile mold belts impart a surface pattern to the moldable material.

20. The method of claim 14, wherein the molded material comprises a synthetic lumber, roofing tiles, molded trim profiles, or siding.

21. A forming apparatus for forming a moldable material, said apparatus comprising:

- a first belt;

- a second belt opposed to said first belt, said first and second belts spaced apart a first distance, each of said first and second belts comprising an inner surface and an outer surface;

- a third belt;

- a fourth belt opposed to said third belt, said third and fourth belts spaced apart a second distance and disposed substantially orthogonal to said first and second belts, each of said third and fourth belts comprising an inner surface and an outer surface;

- a mold cavity defined by said inner surfaces of said first, second, third, and fourth belts; and

- a belt drive mechanism operationally coupled to at least two of said first, second, third, and fourth belts.

22. A forming apparatus in accordance with Claim 21, further comprising first and second opposing contoured mold belts positioned at least partly in said mold cavity, each of said first and second mold belts comprising:

- an inner surface comprising at least one of a profile, surface features, and texture that is molded into a moldable material; and

- an outer surface in contact with said inner surface of said first or second flat belt.



23. A forming apparatus in accordance with Claim 21 wherein said outer surface of said first and second belts are supported by first rigid supporting surfaces.
24. A forming apparatus in accordance with Claim 23 wherein each said first supporting surface comprises a friction reducing substance.
25. A forming apparatus in accordance with Claim 24 wherein said friction reducing substance comprises at least one of a fluoropolymer, an ultra-high molecular weight polyethylene, and other low friction polymers.
26. A forming apparatus in accordance with Claim 23 wherein each said first rigid support surface comprises a plurality of air passage openings in fluid communication with a pressurized air source to provide a pressurized air film between said outer surface of said first and second belts and said second rigid support surfaces.
27. A forming apparatus in accordance with Claim 21 wherein at least one of said first, second, third, and fourth belts is adjustable so that at least one of said first distance and said second distance is variable.
28. A forming apparatus in accordance with Claim 22 wherein each said mold belt comprises an elastomeric face layer for contacting the moldable material, and a reinforced backing layer for contacting said inner surface of said first or said second belt.
29. A forming apparatus in accordance with Claim 21 wherein said outer surface of said third and fourth belts is supported by second rigid supporting surfaces.
30. A forming apparatus in accordance with Claim 29 wherein each said second supporting surface comprises a friction reducing substance comprising at least one of

a fluoropolymer, an ultra-high molecular weight polyethylene, and other low friction polymers.

31. A forming apparatus in accordance with Claim 29 wherein each said second rigid support surface comprises a plurality of air passage openings in fluid communication with a pressurized air film between said outer surface of said third and fourth belts and said second rigid support surfaces.

32. A continuous forming apparatus for forming a moldable material, said apparatus comprising:

- a first pair of opposed closed loop conveyors spaced apart a first distance;
- a second pair of opposed closed loop conveyors spaced apart a second distance and disposed substantially orthogonal to said first pair of conveyors; and
- a mold cavity defined by an area between said first and second pairs of conveyors.

33. A continuous forming apparatus in accordance with Claim 32 further comprising a pair of opposed mold members positioned at least partially in said mold cavity, each said mold member comprising a mold profile.

34. A continuous forming apparatus in accordance with Claim 32 wherein said first pair conveyors are supported by second rigid supporting surfaces.

35. A continuous forming apparatus in accordance with Claim 34 wherein at least one of said first rigid supporting surfaces and said second rigid supporting surfaces comprises a friction reducing substance.

36. A continuous forming apparatus in accordance with Claim 35 wherein said friction reducing substance comprises at least one of a fluoropolymer, an ultra-high molecular weight polyethylene, and other low friction polymers.

37. A continuous forming apparatus in accordance with Claim 34 wherein at least one of said first rigid supporting surfaces and said second supporting surfaces comprises a plurality of air passage openings in fluid communication with a pressurized air source to provide a pressurized air film between said first and said second pairs of conveyors and said first and said second rigid support surfaces.

38. A continuous forming apparatus in accordance with Claim 33 wherein at least one of said first pair of conveyors and said second pair of conveyors are adjusted so that at least one of said first distance and said second distance is variable.

39. A continuous forming apparatus in accordance with Claim 32 wherein each said mold member comprises an elastomeric face layer for contacting the moldable material.

### ABSTRACT OF THE DISCLOSURE

A system for providing shape and/or surface features to a moldable material includes, in an exemplary embodiment, at least two first opposed flat endless belts spaced apart a first distance, with each having an inner surface and an outer surface. The system also includes at least two second opposed flat endless belts disposed substantially orthogonal to the first two opposed endless belts and spaced apart a second distance. A mold cavity is defined at least in part by the inner surfaces of the at least two opposed flat endless belts. The system further includes a drive mechanism for imparting motion to at least two of the opposed flat endless belts.

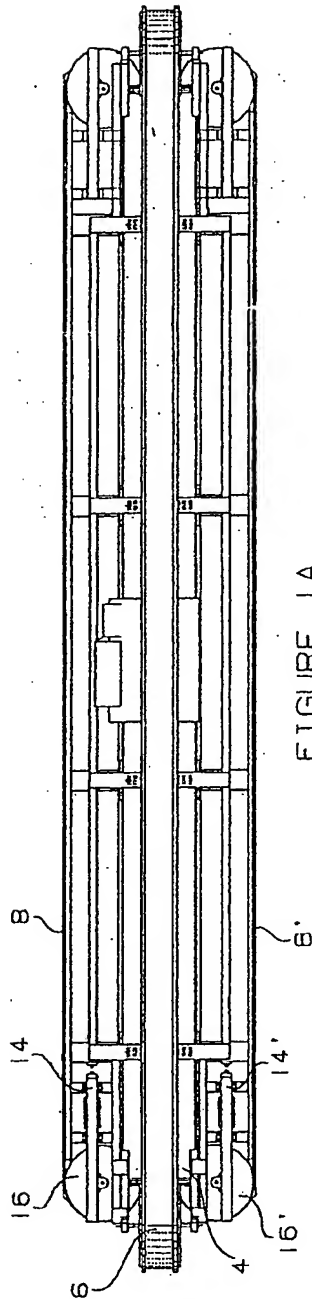


FIGURE 1A

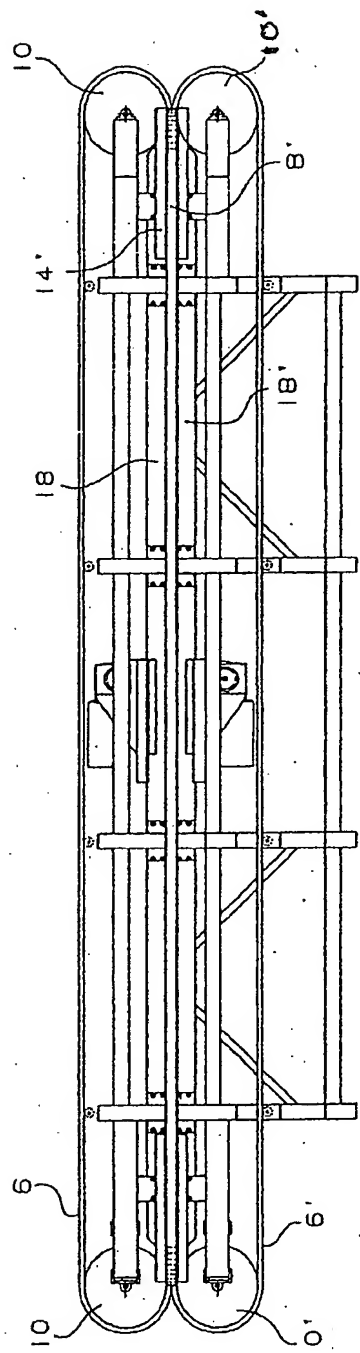


FIGURE 1B

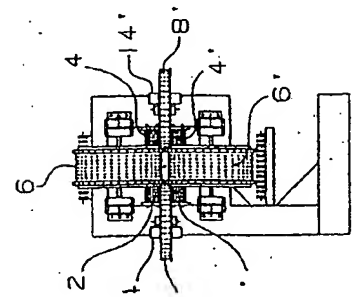


FIGURE 1C

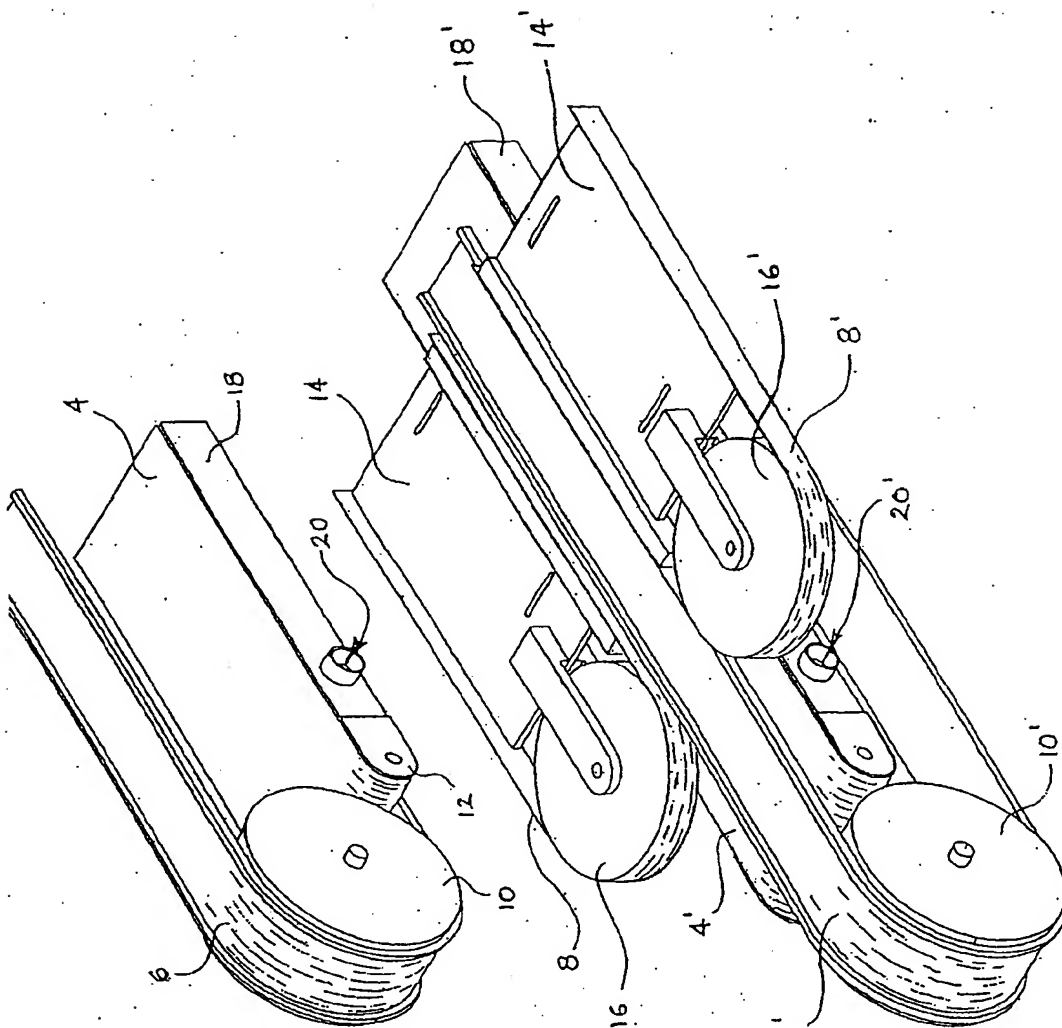


FIGURE 2

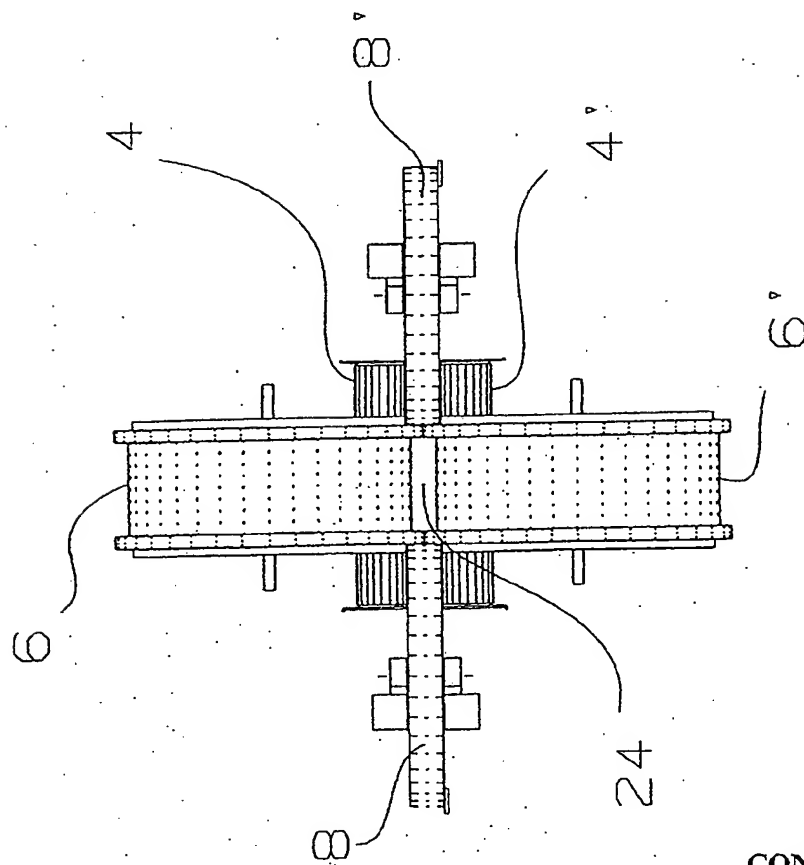


FIGURE 3A

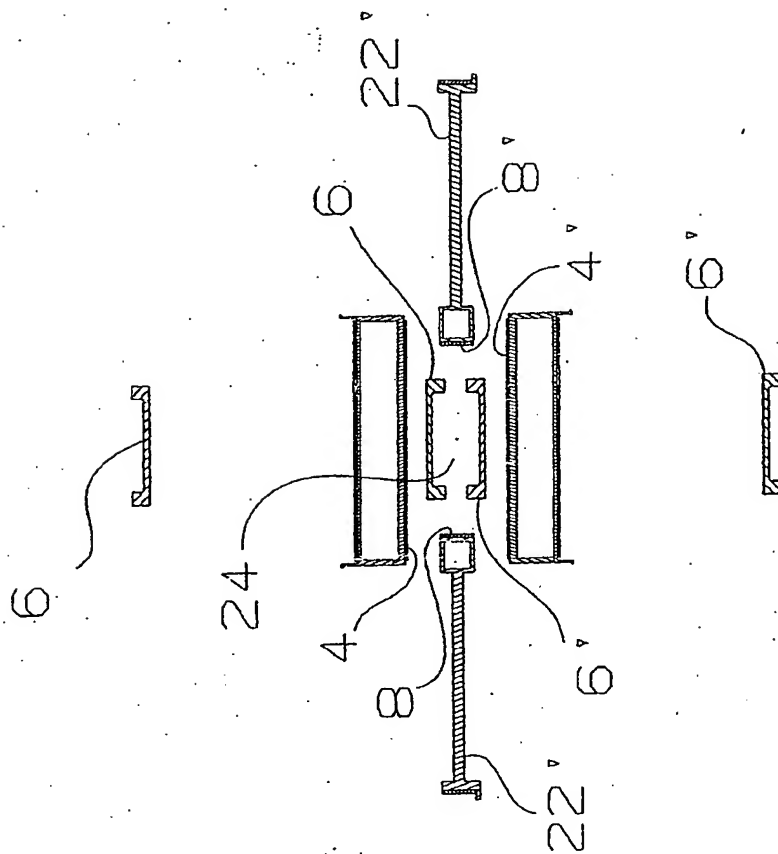


FIGURE 3B

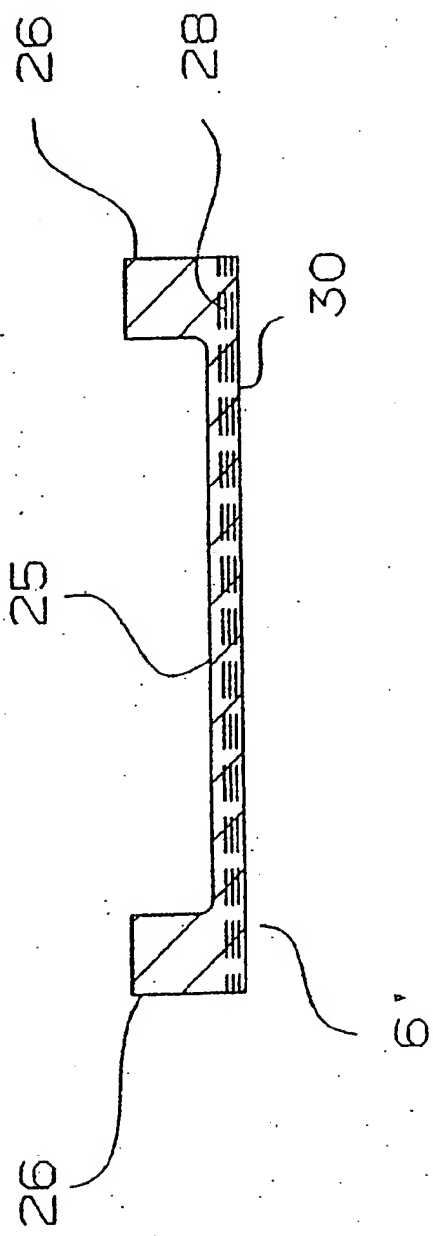


FIGURE 4



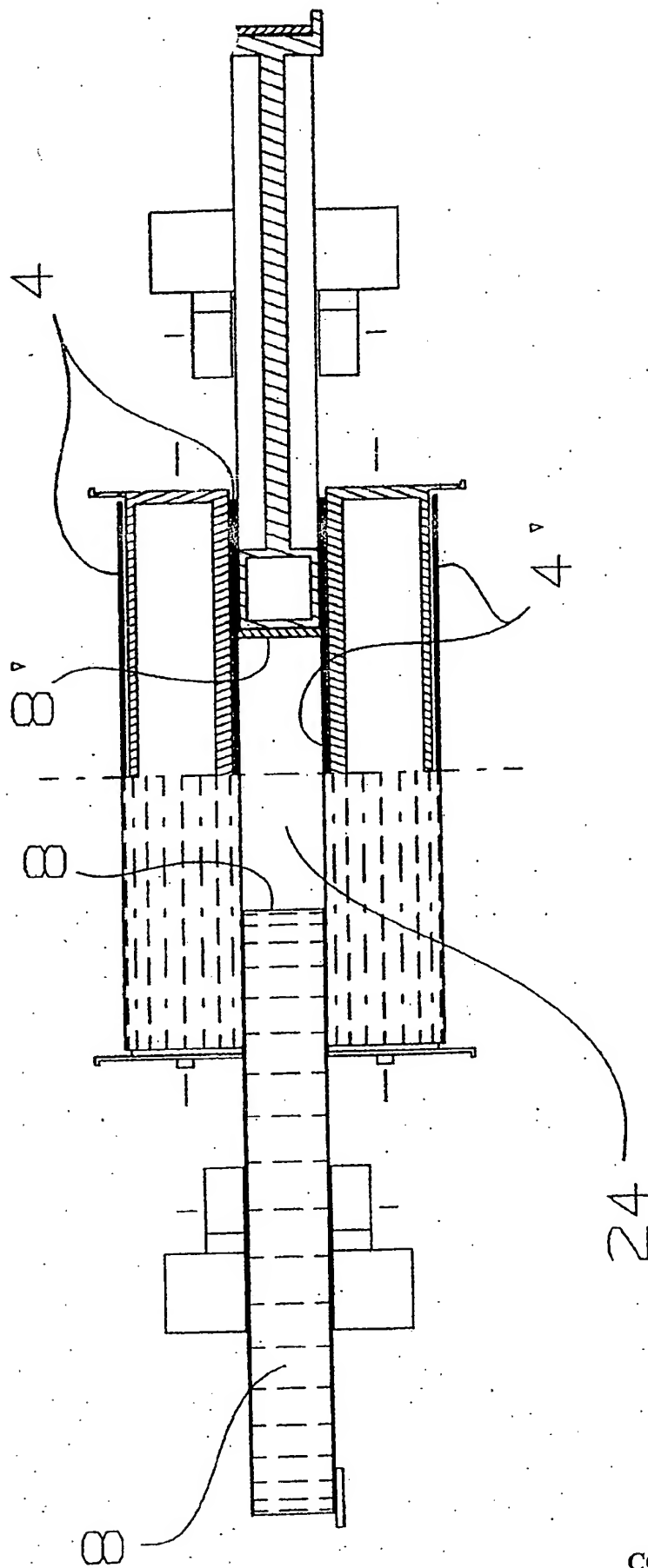


FIGURE 5

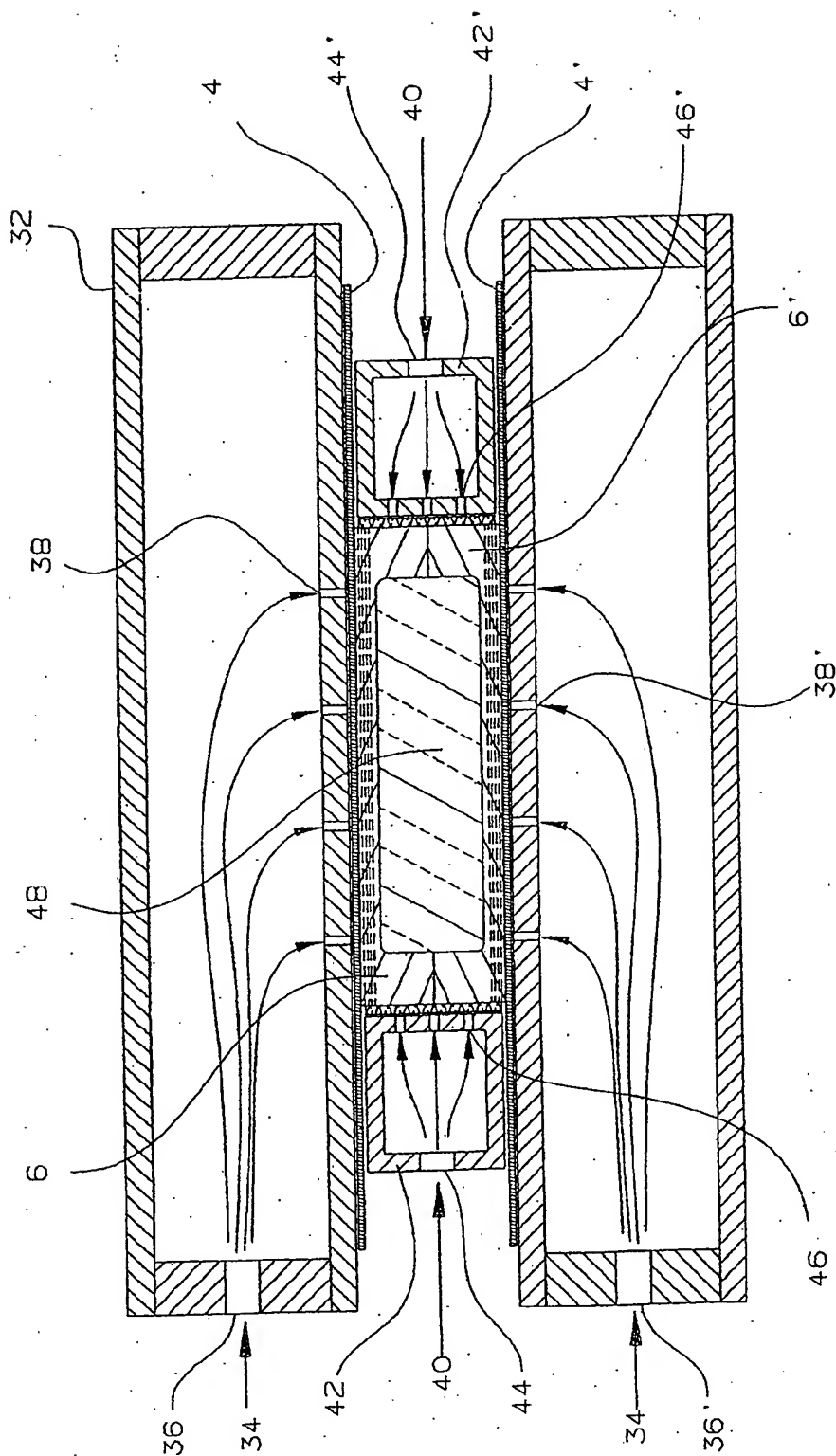


FIGURE 6

# Tab 7

## In the United States Patent and Trademark Office

Box Provisional Patent Application  
Assistant Commissioner for Patents  
Washington, District of Columbia 20231

Mailed 2004 June 24

Sir:

Please file the enclosed Provisional Patent Application (PPA) papers listed below under 37 C.F.R. § 1.53(b)(2).

The undersigned understands:

- A. This PPA is not a substitute for a Regular Patent Application (RPA), cannot be converted to an RPA, cannot get into interference with an RPA of another person, cannot be amended, will not be published, cannot claim any foreign priority, and will not mature into a patent;
- B. If an RPA referring to this PPA is not filed within one year of the filing date of this PPA, this PPA will be worthless and will be destroyed;
- C. Any desired foreign Convention applications (including PCT applications) based upon this PPA must be filed within one year of the filing date of this PPA;
- D. This PPA must contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention. 35 U.S.C. § 112, ¶ 1. Otherwise this PPA will be worthless.
- E. Any RPA will be entitled to claim the benefit of this PPA only if such RPA names a least one inventor of this PPA and this PPA discloses such inventor's invention, as claimed in at least one claim of the RPA, in the matter provided in Item D above.

Tentative Applicant # 1, Name: Zachary R. TaylorTentative Applicant # 2, Name: Wade BrownTitle: Continuous Forming Apparatus for Three-Dimensional Foamed Products(x) Specification, sheets: 5(x) Drawing(s), sheets: 9(x) Small Entity Declaration(s): 1

(x) Check for \$80.00 for small entity filing fee

(x) Return Receipt Postcard Addressed to Applicant.

Very respectfully,

Applicant # 1 Signature

23234 Single Oak Way, Murietta, CA 92562  
Address (Send Correspondence Here)

Applicant # 2 Signature

Address

Express Mail Label #

; Date of Deposit: 2004 June 24

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Signed:

Inventor

CB02141  
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7

## In the United States Patent and Trademark Office

First Applicant: **Zachary R. Taylor**  
Joint/Second Applicant: **Wade Brown**

Title: **"Continuous Forming Apparatus for Three-Dimensional Foamed Products"**

## Small Entity Declaration - Independent Inventor(s)

As a below-named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Section 41 (a) and (b) of Title 35 United States Code, to the Patent and Trademark Office with regard to my above-identified invention described in the specification filed herewith. I have not assigned, granted, conveyed, or licensed - and am under no obligation under any contract or law to assign, grant, convey, or license - any rights in the invention to either (a) any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or (b) any concern which would not qualify as either (i) a small business concern under 37 CFR 1.9(d) or (ii) a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed - or am under an obligation under contract or law to assign, grant, convey, or license - any rights in the invention is listed below:

☒ There is no such person, concern, or organization.

☐ Any applicable person, concern, or organization is listed below: \*

Full Name: \_\_\_\_\_

Address: \_\_\_\_\_

I acknowledge a duty to file, in the above application for patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

  
\_\_\_\_\_  
Signature of First Inventor

**Zachary R. Taylor**  
\_\_\_\_\_  
Print Name of Sole Inventor

**2004 June 22**  
\_\_\_\_\_  
Date of Signature

  
\_\_\_\_\_  
Signature of Joint/Second Inventor

**WADE BROWN**  
\_\_\_\_\_  
Print Name of Joint/Second Inventor

**24 June 2004**  
\_\_\_\_\_  
Date of Signature

\* Note: A separate Small Entity Statement is required from any listed entity.

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**CONFIDENTIAL**

3rd new patent  
made -  
mold can be used  
2005

## Continuous Forming Apparatus for Three-Dimensional Foamed Products

### FIELD OF THE INVENTION

The present invention is in the field of continuous forming apparatus for forming foamed materials into three-dimensional shapes.

### BACKGROUND

The production of three-dimensional products made from foamed material requires a mold that can both define the three-dimensional shape and contain any pressure due to foaming until the product is rigid enough to de-mold. Endless flexible mold belts may be used to form 3-D products on a continuous basis. This may be done by arranging one or more flat belts edge to edge so as to form a cavity, or by using two thicker belts, arranged face to face, with mold cavity extending into one or both of the belt faces. Such mold-belts are typically fabric-reinforced, and may be faced with an elastomeric, contoured mold face so as to allow the molding of deeper features and allow mold belt sufficient flexibility to bend around pulleys of reasonably small diameter. The belts may be incorporated into a motorized forming apparatus. An extruder or other delivery system may be used to deliver material into one end of a forming apparatus where it is held and conveyed within a mold belt cavity until the material is sufficiently cured or cooled to maintain its shape after being expelled from the apparatus.

While such mold belts may define the desired three-dimensional product shape, they must be driven in the direction of production, and supported so as to contain the pressure of the foaming material without deforming. Typically mold belts are driven by a motorized pulley and supported by either slider-beds or by support rollers in much the same way as a conventional conveyor belt. Slider-bed supported systems must overcome the pressure-induced friction between the back of the belt and the slider-bed. The wider the product and longer the forming apparatus, the greater the friction that the drive mechanism must overcome. This limits the practical size of a slider-bed supported forming apparatus for foamed materials.

Roller-supported mold belts minimize mold belt-to-bed friction, but the belts are unsupported in the spans between adjacent rollers, allowing the belt to deflect outward. The unsupported spans can allow the belts to gap open or separate and may allow some of the foaming material to escape.

## DESCRIPTION

The invention disclosed in this application is a new type of forming apparatus capable of containing high loads due to foaming over relatively long lengths. The apparatus incorporates the use of two or more cleated conveyors with cleats facing each other in much the same way as a cleated puller. Profiles would be included in the cleats in such a way that opposing sets of cleats form an axial cavity that closely matches the outer profile of the mold belts. This would allow one or more mold belts to be supported externally by the cleat sets and pulled or driven in the direction of production. The actively engaged cleats function as a segmented mold box that continuously closes around mold belts and conveys them in the direction of production. The conveyors incorporated into an apparatus must driven at the same speed so as to avoid damage to the captured mold belts or product within. The mold belts may be un-powered or idlers, driven by the cleated conveyors.

The cleats must be rigid enough to contain pressure due to product foaming and the gap between adjacent cleats on the same chain should be kept to a practical minimum so as to minimize unsupported belt spans.

Each cleat is attached to an endless length of attachment chain. The actively engaged (inward facing) length of each chain is supported by rigid slide rails or similar features mounted to, or incorporated into an appropriate frame. Compressive loads from the foaming material would press the mold belts into the rigid cleat profile. The normal loads that would tend to separate the opposing cleats are reacted through the attachment chain to the slide rails and supporting frame. To minimize friction, attachment chain typically has rolling elements that contact the supporting slide rails. Positive drive engagement is provided by the use of sprockets that engage and redirect the chain links. A speed-controlled motor may be mechanically linked to a sprocket to drive the forming apparatus. A single motor may be mechanically linked to more than one conveyor so as to assure that all conveyors in the same apparatus run at the same speed, or separate motors that are electronically linked so as to match speed may be used to drive each of the cleated conveyors.

The use of high-strength chains and sprockets allows considerable pulling force to be used in driving the apparatus in the direction of production. The chain's rolling elements against rigid rails minimize friction within the apparatus and allow longer and wider belts to be driven and larger products processed.

Frame extensions and belt pulleys may be incorporated into the cleated conveyors in such a way as to allow one or more endless mold belts to be supported on the pulleys and continuously fed into the cleat profile cavity. After exiting the cleated conveyors each mold belt would round a belt pulley and return outside the cleated conveyor to the inlet end of the apparatus. A single continuous mold belt may be rolled or folded so as to define the mold cavity, or multiple belts may be arranged with mold faces inward and adjacent edges sealing against each other. The mold belt cavity may impart any 3-dimensional shape, profile, texture, or features into the product.

One configuration of the apparatus is shown in Figure 1 where two mold belts, facing each other, are captured and conveyed by two, face to face, cleated conveyors. Material is fed into the apparatus at the entrance to the travelling mold or material inlet between the closing mold belts. After passing the belt pulleys which bring the two belts face to face, the belts may be held together and guided by support beds until the belts are captured within the opposed or actively engaged cleats. The actively engaged cleats convey the belts and foamed material through the apparatus. The length of the forming apparatus must be long enough, and/or speed of conveyor travel slow enough, to assure that the foamed material be sufficiently cool and/or cured to maintain the desired shape when exiting the forming apparatus.

A cross section of the configuration is shown in Figure 2. This figure shows how the opposed cleats capture and close the two mold belts, and how loads normal to the conveyor (such as those due to material foaming) are reacted through the cleats to the attachment chain and supporting rails and frame. This figure also shows the rough positions of the returning (non-actively-engaged) cleats and mold belts.

Figure 3 shows another configuration wherein a single mold belt is coiled into a round tube by belt-shaping rollers, then captured and conveyed by a pair of cleated conveyors. The mold belt may impart surface features or texture to the product surface, and may also incorporate non-stick films or compounds as mold release agents. In this configuration the rounded cleat profiles hold the mold belt in the desired shape during processing. Upon exiting the cleated portion of the forming apparatus, the belt is peeled from around the product and redirected by the belt pulley to the inlet.

Figure 4 shows a cross section of this second configuration. The coiled mold belt is shown captured and shaped by the profiled cleats which rigidly contain the foaming material. The figure also shows how the slide rails and frame support the cleated chains.

Four mold belts may be contained within a pair of cleated conveyors as shown in Figure 5. This configuration may be advantageous in the production of deeper or thicker sections that would otherwise require excessively thick mold belts. This configuration allows the upper and lower mold belts to remain relatively flat. Side belts would form some or all of the product's side profile, then be routed back around to the material inlet. The sides of the cleat cavities would support the side belts.

A cross section of the four belt, two-conveyor configuration is shown in Figure 6. This figure shows how the opposed cleats capture and support the four mold belts. A bevel or other extending feature may be incorporated into the edges of the mold belts in such a way that when the cleats are actively engaged and the mold belts are captured, the raised edge is compressed to create a seal between adjacent mold belts.

For large product profiles, or machines requiring a relatively long processing length, a configuration using more than two cleated conveyors may be used. A configuration using four cleated conveyors to contain and convey four mold belts is shown in Figure 7.



The configuration shown employs upper and lower conveyors and two cleated side conveyors. In this configuration, each mold belt is supported by its own cleated conveyor. The belts are captured in such a way that the side belts are slightly compressed edgewise by the upper and lower mold belts to create a seal between mold belts and thereby prevent the escape of expanding material. An added advantage of this configuration is that the distance between side conveyors and their respective mold belts may be adjusted, allowing the same equipment to produce profiles of common depth but various widths. If synthetic lumber were being produced, this could allow the same forming apparatus to produce dimensional lumber in 2X2, 2X4, 2X6, 2X8, 2X10 sizes with only minor adjustments to the side conveyor positions. A sectional view of this four belt, four-conveyor configuration is shown in Figure 8. This figure shows how narrow side-cleat fingers penetrate between the fixed-gap upper and lower mold belts to provide continuous support to the side mold belts.

Each cleated conveyor may be powered or driven at matched speed. Smaller conveyors may be unpowered and idle, relying on adjacent powered conveyors and mold friction to drag them along at the needed speed.

The cleats used in the forming apparatus may be made of nearly any rigid or semi-rigid material such as metal, plastic, rubber, composite, ceramic, or a combination thereof. The cleats may incorporate a base that stays attached to the chain and an easily removable cleat profile to facilitate changes in profile and product size. The cleat profiles may include a radius, angle, or other feature on the sides of its belt-supporting profile to allow the belt to easily center itself within the cleat. As an example, the cleats and mold belts shown in Figure 2 share angled sides that are wider at the opening to help the belts center and nest themselves into the cleats.

While the opposed cleats shown in the above configurations share identical profiles, this need not be the case. The profiles of opposed cleats may vary greatly depending on the shape of the product and how the manufacturer prefers to divide the overall cavity. Figure 9 shows a cleat configuration where the lower cleat has a much deeper profile than the upper cleat. The configuration shown is a four mold belt, two-conveyor configuration similar to the configuration shown in Figure 6. The lower and side mold belts nest into the lower cleat creating a cavity that material can be poured into before the upper belt and conveyor are engaged to seal the mold. The upper cleat supports only a wide upper mold belt. This cleat configuration allows various profile widths to be produced by changing only the lower cleat and mold belt. A two mold belt, two-conveyor system using this type of cleat configuration would be able to produce a wide variety of product sizes and shapes by changing only the lower mold belt to one with a different profile.

In addition to their roll in defining the product shape and texture, mold belts may incorporate localized features (such as pockets, ridges, knobs, clips, brackets, etc.) in the mold belt cavity may be used to locate and hold inserts in position that will be cast or molded into the product. The inserts may be embedded into the product for reinforcement, thread attachment, handles, hard points, wear plates, internal conduit or

plumbing, electrical wiring, or any such characteristic that might enhance product performance or eliminate subsequent assembly.

The invention described may be used in the production of a variety of foamed products including, but not limited to: synthetic lumber, roofing, siding, interior molding & trim, panels, fencing, doors, window blind slats, etc.

Foamed materials that may be processed by the above-described invention include, but are not limited to: foamed thermoplastics, foamed thermoset plastics, foamed ceramic or concrete materials, foamed ceramic/plastic blends, and composites.

### FABRICATION

Conventional laminated conveyor belts may be used as mold belts. Mold belts requiring greater depth may be fabricated by casting a rubber mold face onto an existing belt or fabric-reinforced carcass. Thicker belts may also have the mold surface or product-molding cavity machined or otherwise carved into the belt face. Release films or layers at the outer surfaces of the belts may also be incorporated into mold belts to facilitate release from the formed product.

The cleats may be machined, molded, cast, extruded, or a combination thereof out of metal, plastic, rubber, composite, ceramic, or a combination of materials.

The frame of the apparatus may be made of any suitable rigid material.

Although the descriptions above contain many specific details they should not be construed as limiting the scope of the invention or the methods of use, but merely providing illustration of some of the presently preferred embodiments of the invention. Mold belt composition, number and shape of mold belts, cleat shape and composition, style of chain and method of attachment, and number and orientation of conveyor elements may vary.

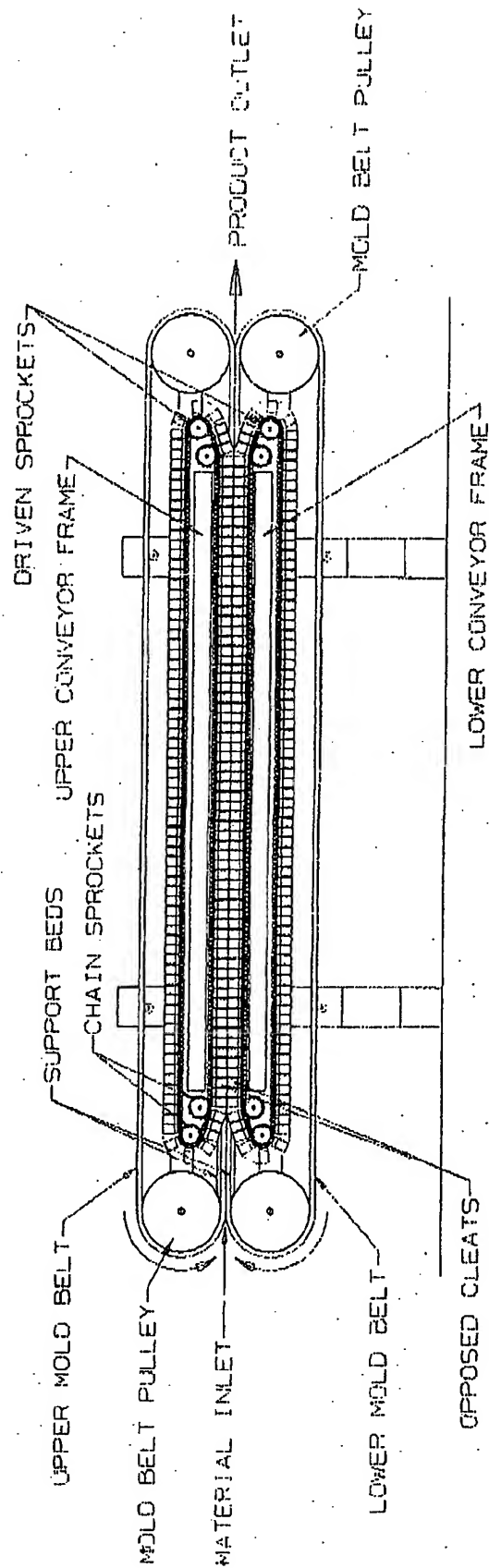


FIGURE 1: SIDE VIEW OF FORMING APPARATUS USING TWO MOLD BELTS;  
AND CLEATED CONVEYORS.  
NOTE: FRAME ELEMENTS REMOVED FOR CLARITY.

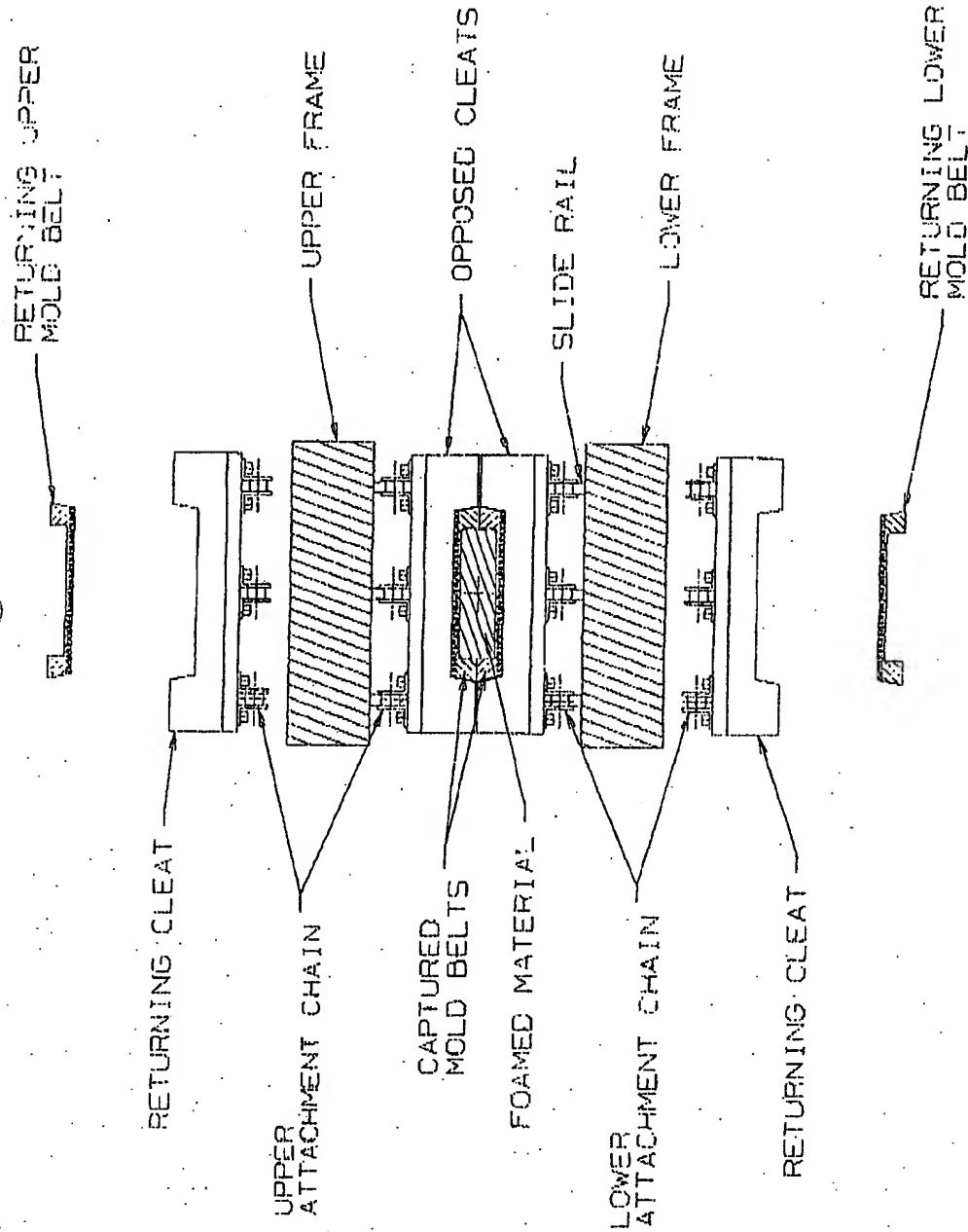


FIGURE 2: SECTION VIEW OF FORMING APPARATUS SHOWING CAPTURED MOLD BELTS WITHIN OPPOSED CLEATS.

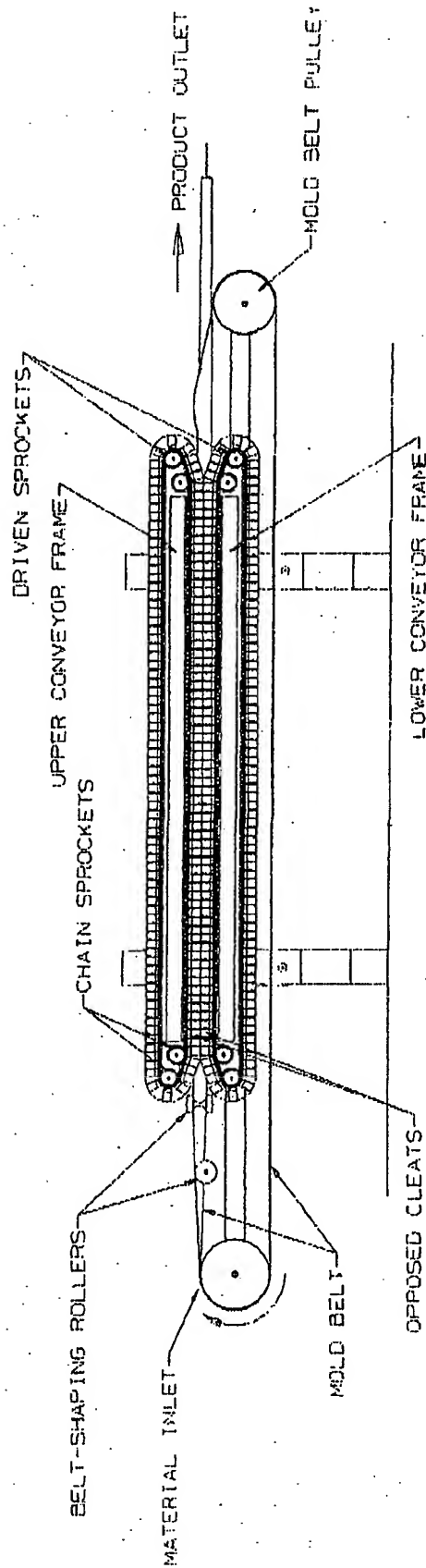


FIGURE 3: SIDE VIEW OF FORMING APPARATUS USING A SINGLE FLAT MOLD BELT AND CLEATED CONVEYORS.  
NOTE: FRAME ELEMENTS REMOVED FOR CLARITY.

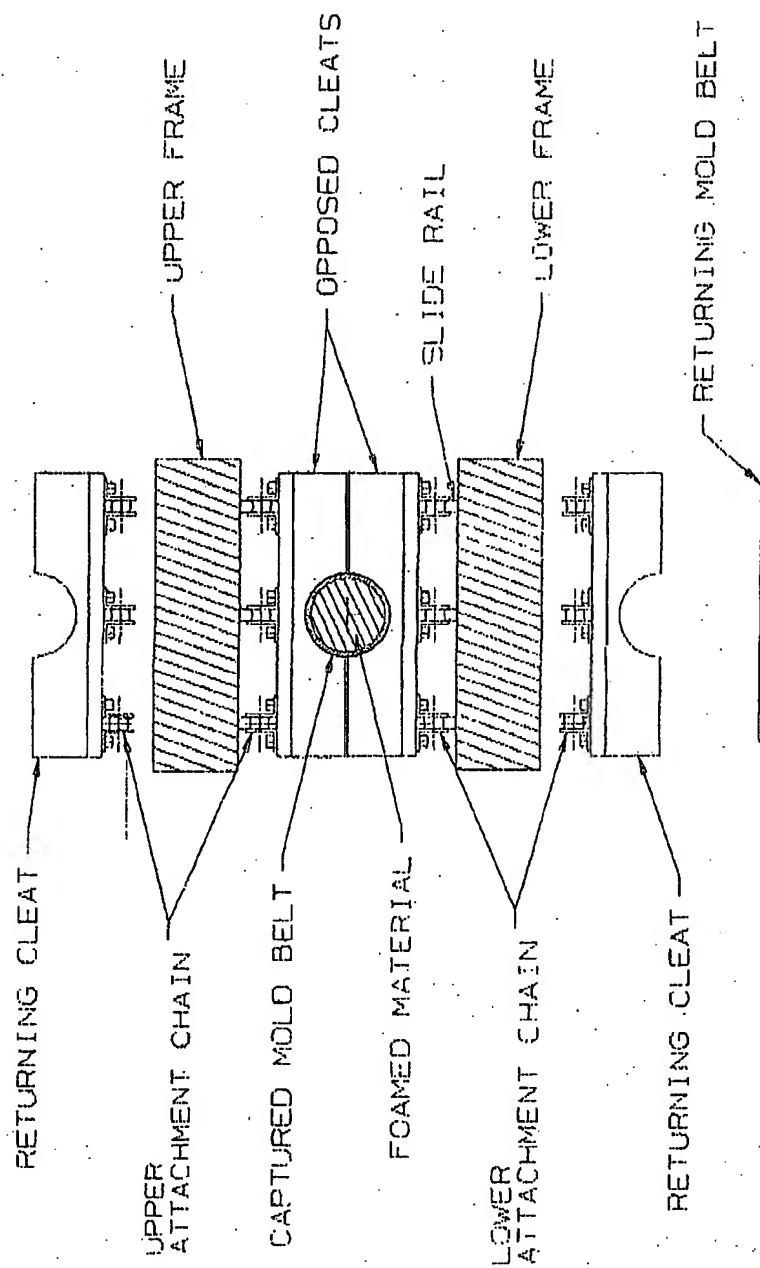
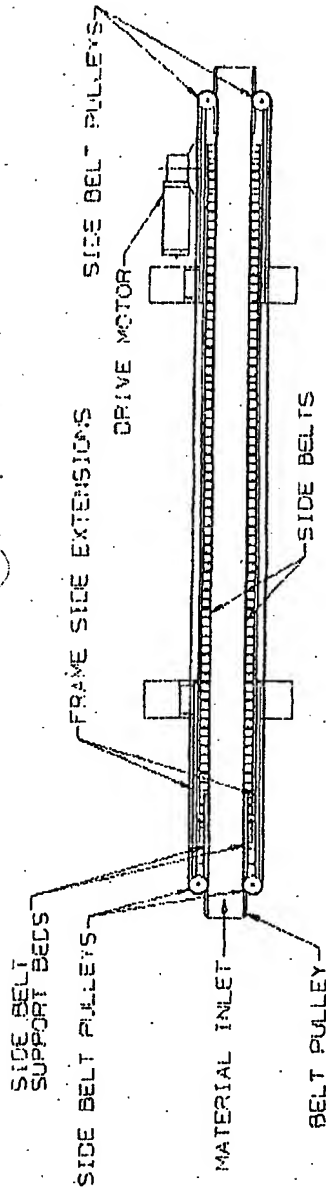


FIGURE 4: SECTIONAL VIEW OF FORMING APPARATUS SHOWING FORMED SINGLE MOLD BELT WITHIN OPPOSING CLEATS.

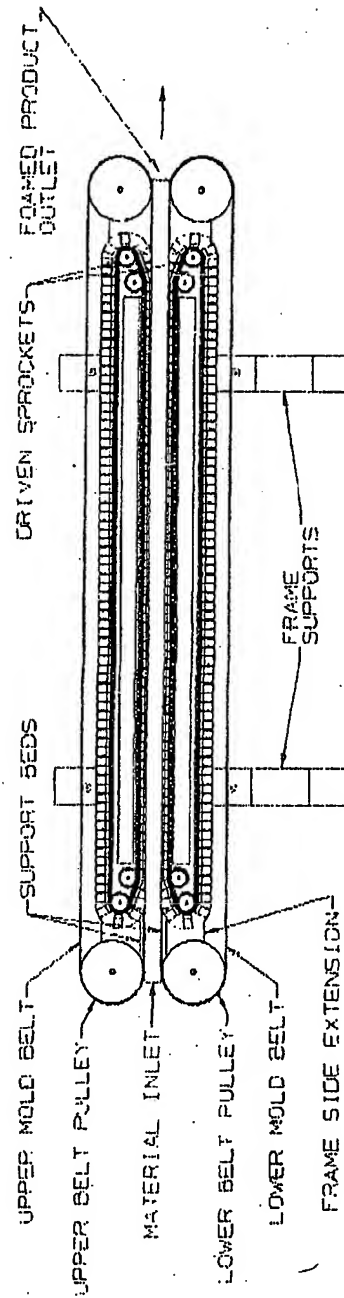
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TOP VIEW

NOTE: UPPER BELT &amp; CONVEYOR REMOVED FOR CLARITY



SIDE VIEW

NOTE: FRAME SIDE ELEMENTS REMOVED FOR CLARITY

FIGURE 5: SIDE AND TOP VIEW OF FORMING APPARATUS WITH 4 MOLD BELTS AND 2 CLEATED CONVEYORS

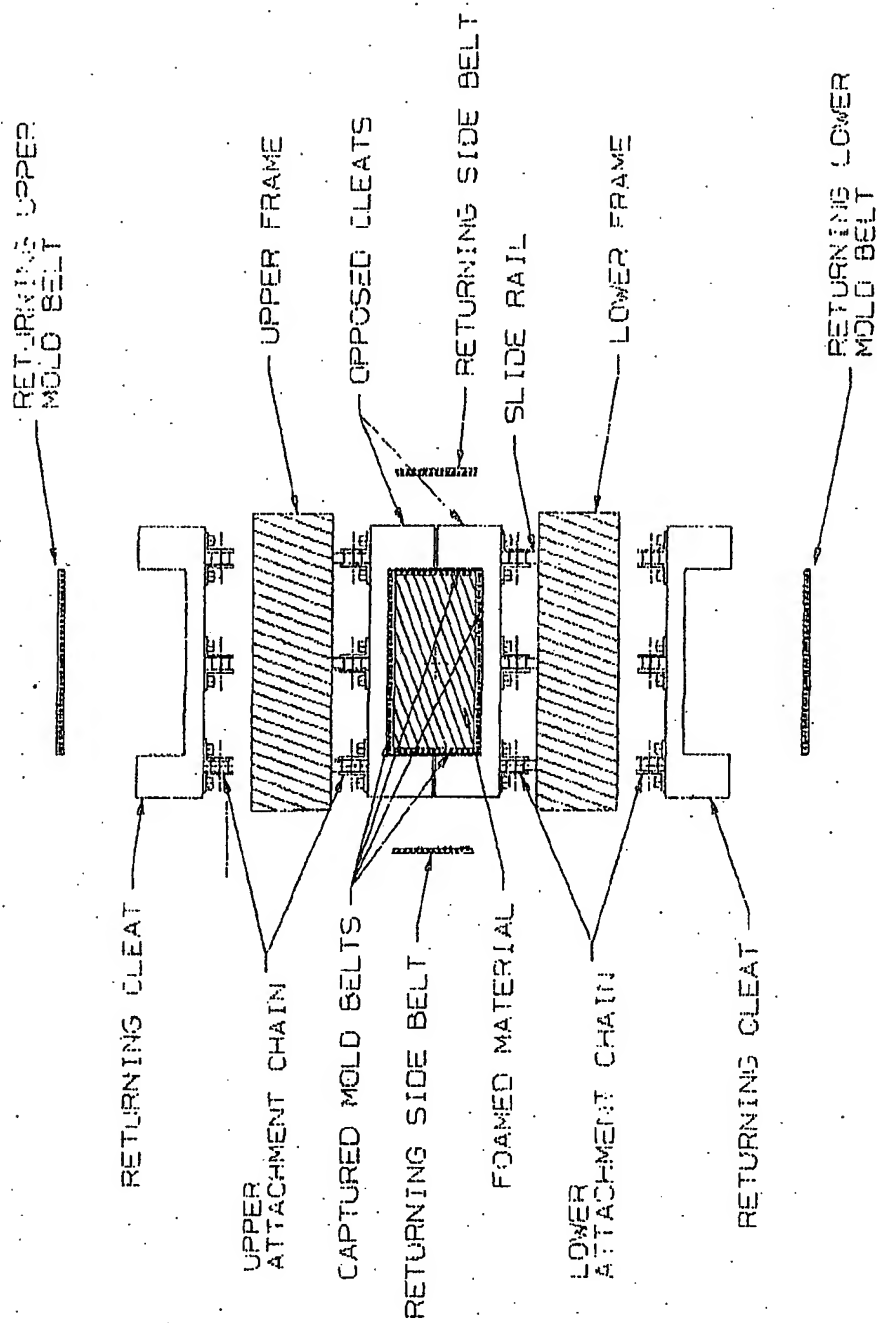


FIGURE 8: SECTION VIEW OF FORMING APPARATUS SHOWING FOUR CAPTURED MOLD BELTS WITHIN OPPOSED CLEATS.



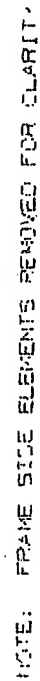
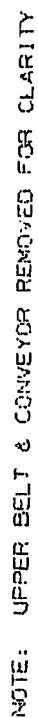


FIGURE 7: SIDE AND TOP VIEW OF FORMING APPARATUS WITH 4 MOLD BELTS AND 4 CLEATED CONVEYORS

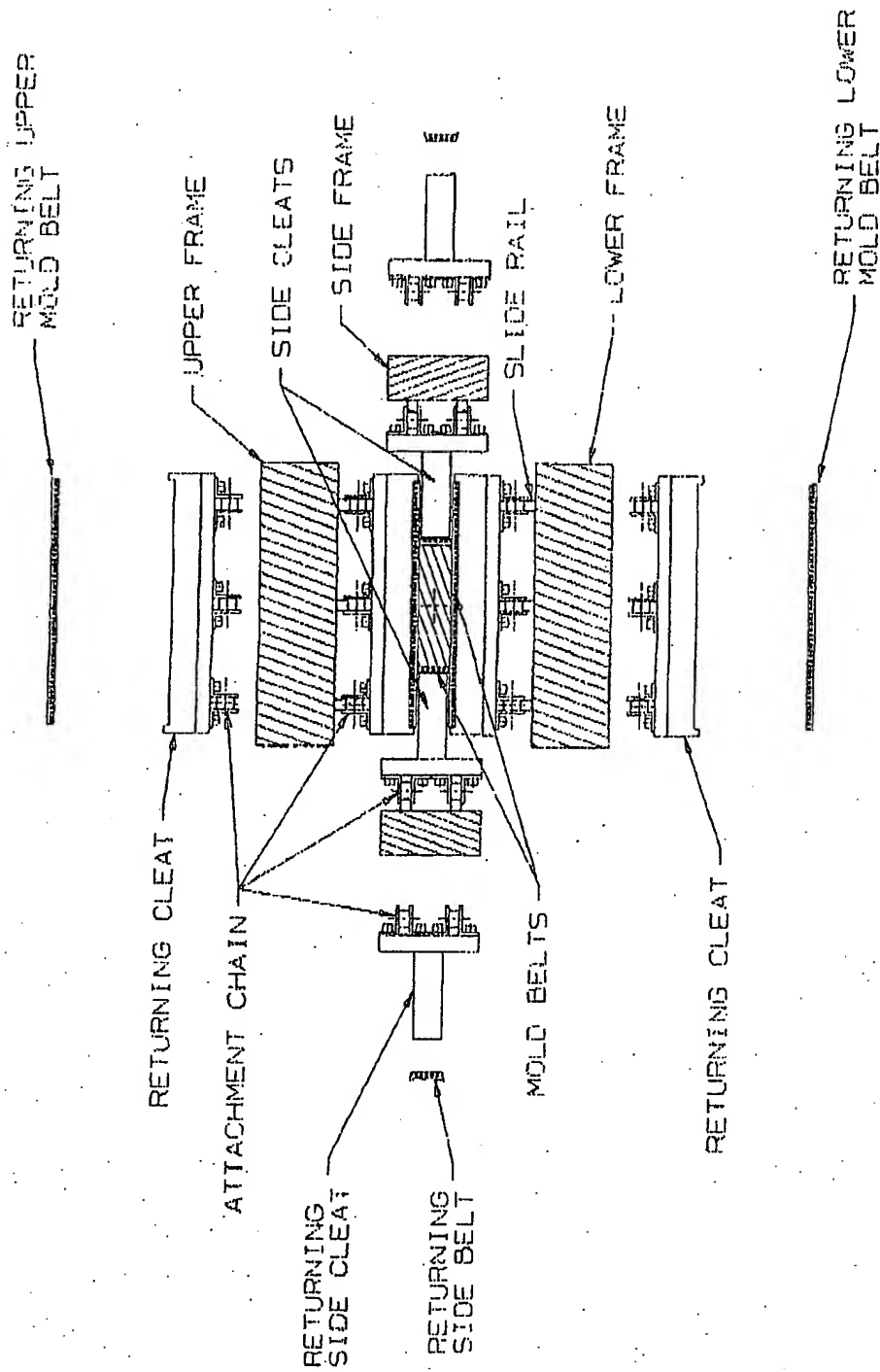


FIGURE 8: SECTION VIEW OF FORMING APPARATUS SHOWING FOUR MOLD BELTS AND FOUR CLEATED CONVEYORS.

NOTE: SIDE CONVEYORS MAY BE ADJUSTABLE FOR VARIOUS PRODUCT WIDTHS.

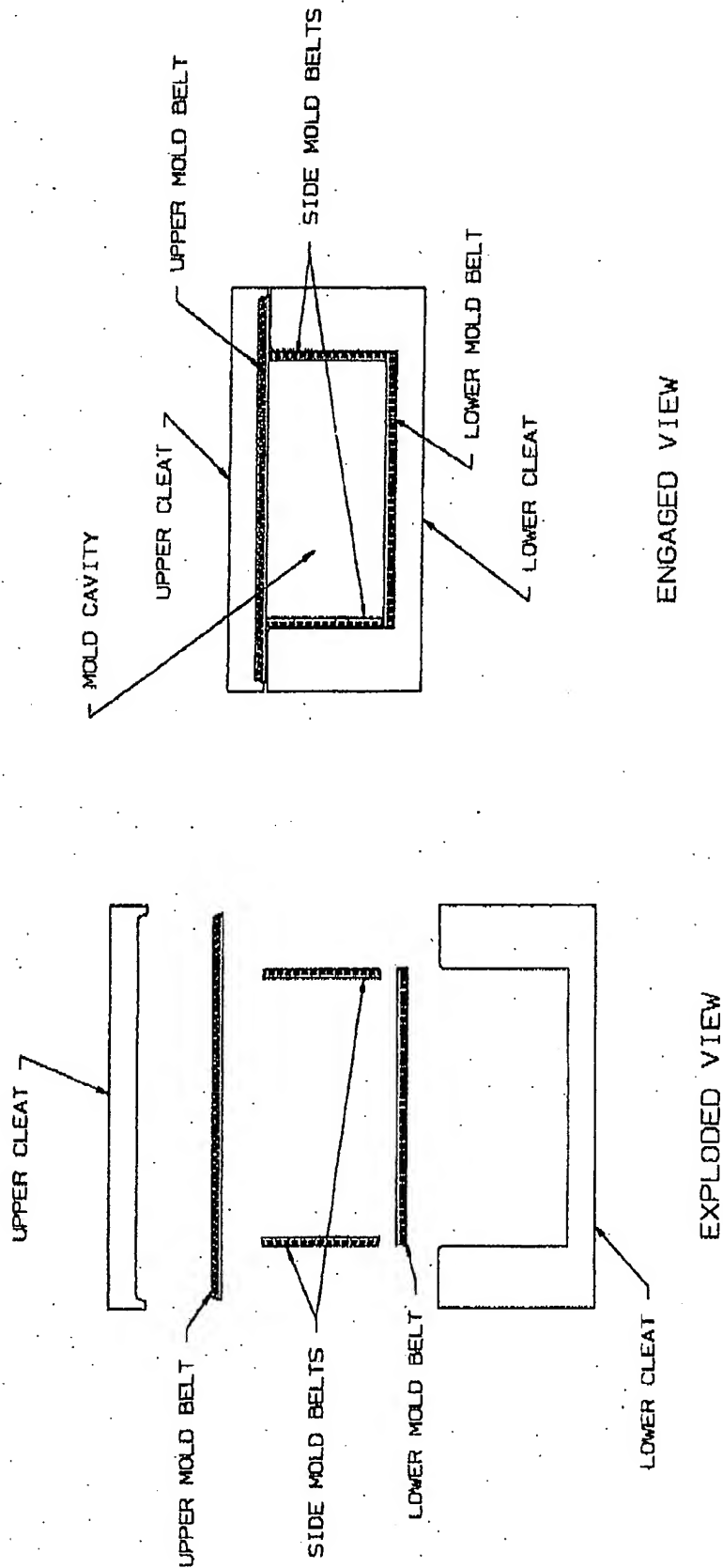


FIGURE 9: SECTION VIEW OF 4 MOLD BELTS WITHIN PAIR OF UNEQUAL CLEATS.

# Tab 8

Title: CONTINUOUS FORMING APPARATUS FOR THREE-DIMENSIONAL FOAMED PRODUCTS

Inventor: Zachary Taylor

Serial No.: 11/165,071

Docket No.: 3538.2.1

REPLACEMENT SHEETS

1 / 10

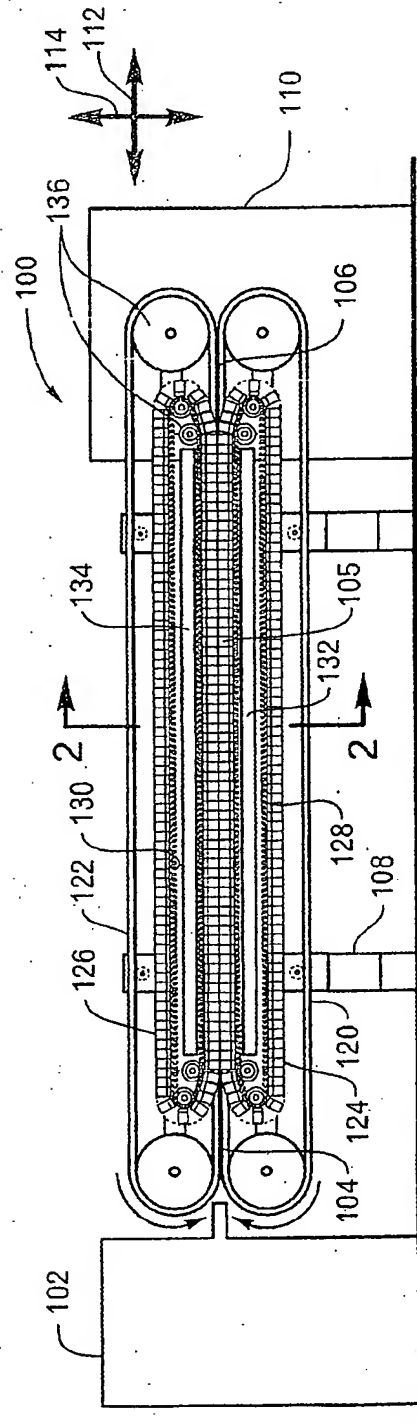


FIG. 1

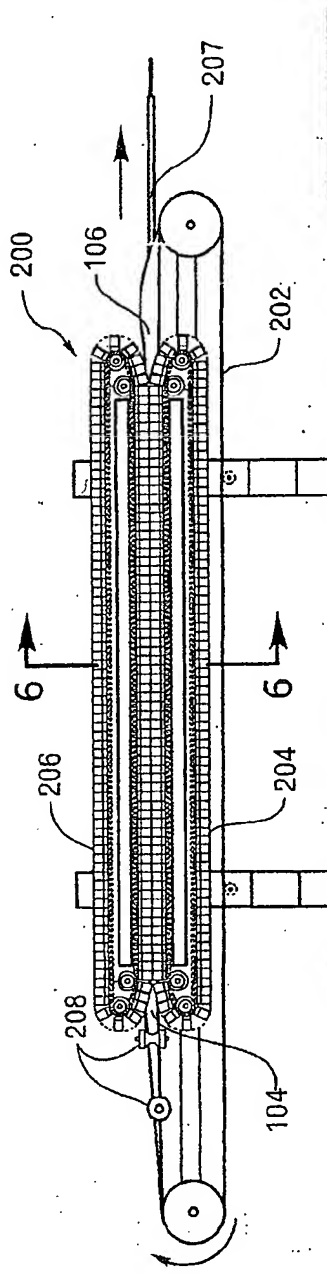


FIG. 5

Title: CONTINUOUS FORMING APPARATUS FOR THREE-DIMENSIONAL FOAMED PRODUCTS

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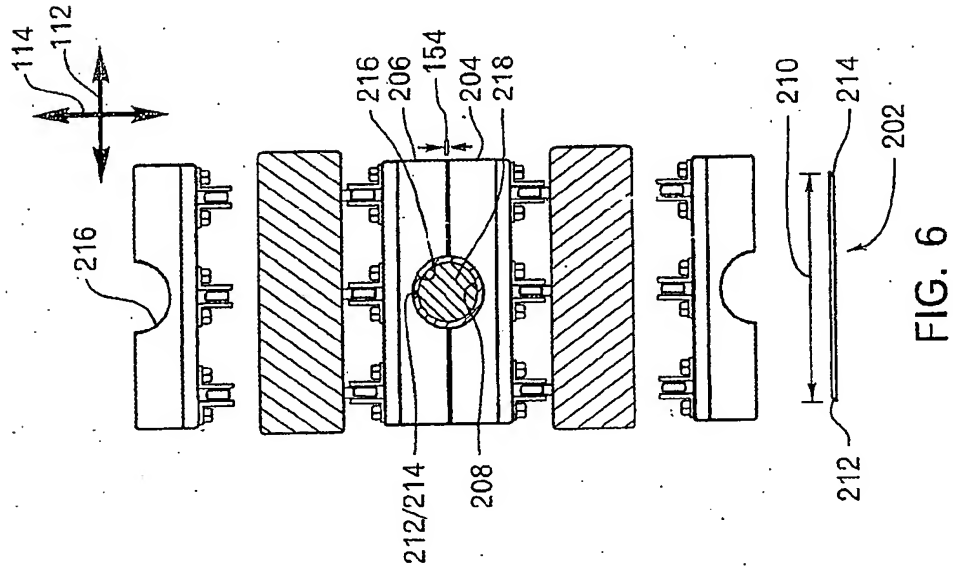


FIG. 6

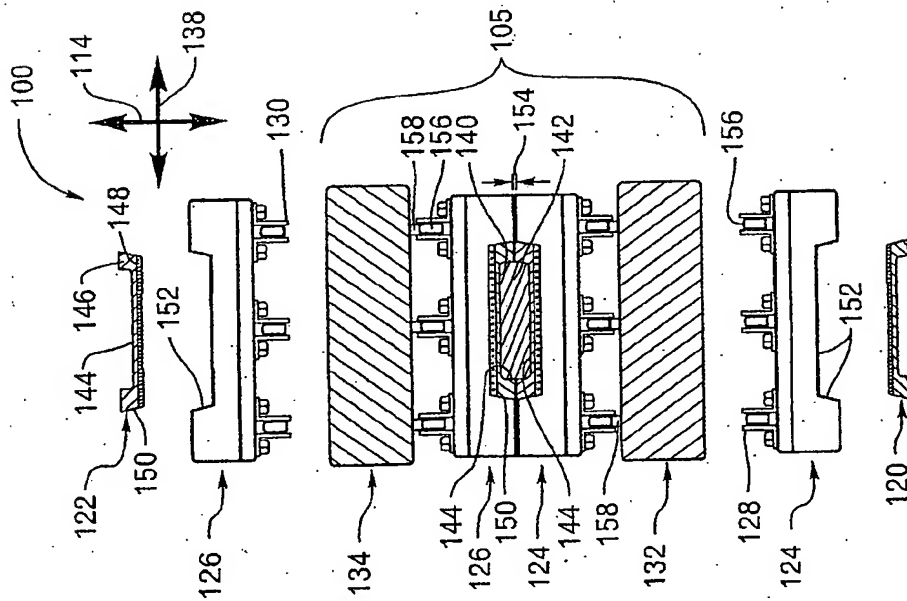


FIG. 2

Title: CONTINUOUS FORMING APPARATUS FOR THREE-DIMENSIONAL FOAMED PRODUCTS

Inventor: Zachary Taylor

Serial No.: 11/165,071

Docket No.: 3538.2.1

REPLACEMENT SHEETS

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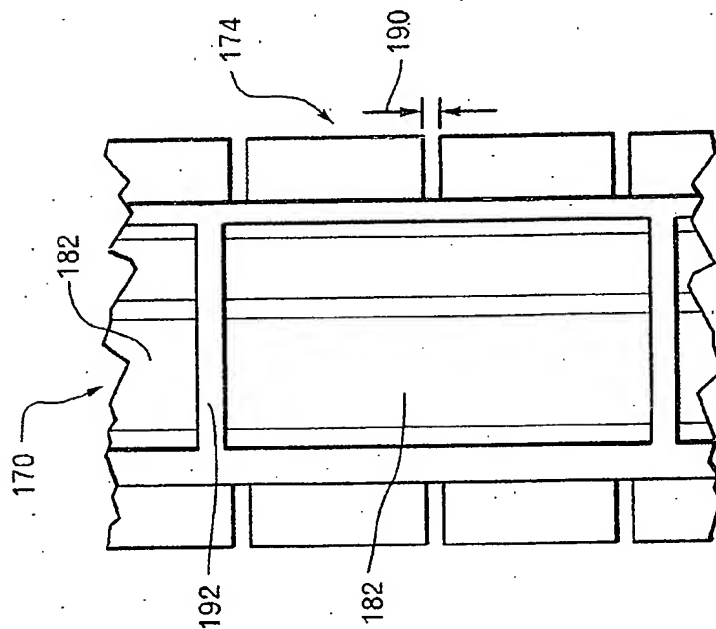


FIG. 4

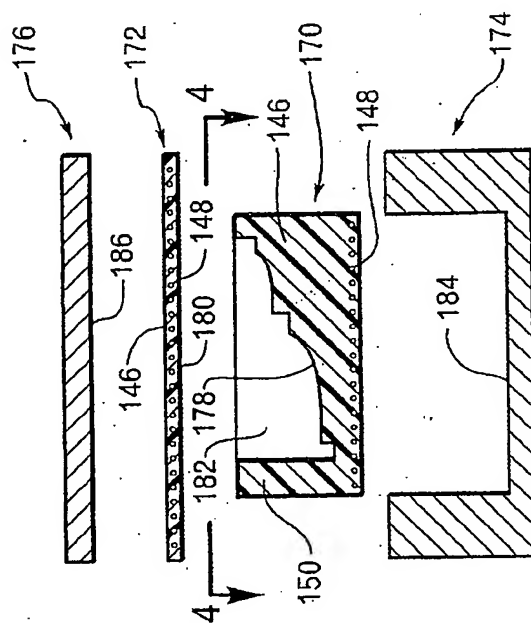


FIG. 3

Title: CONTINUOUS FORMING APPARATUS FOR THREE-DIMENSIONAL FOAMED PRODUCTS

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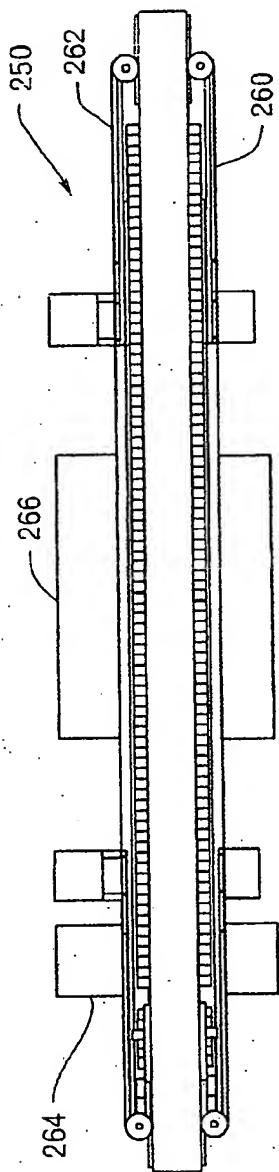


FIG. 8

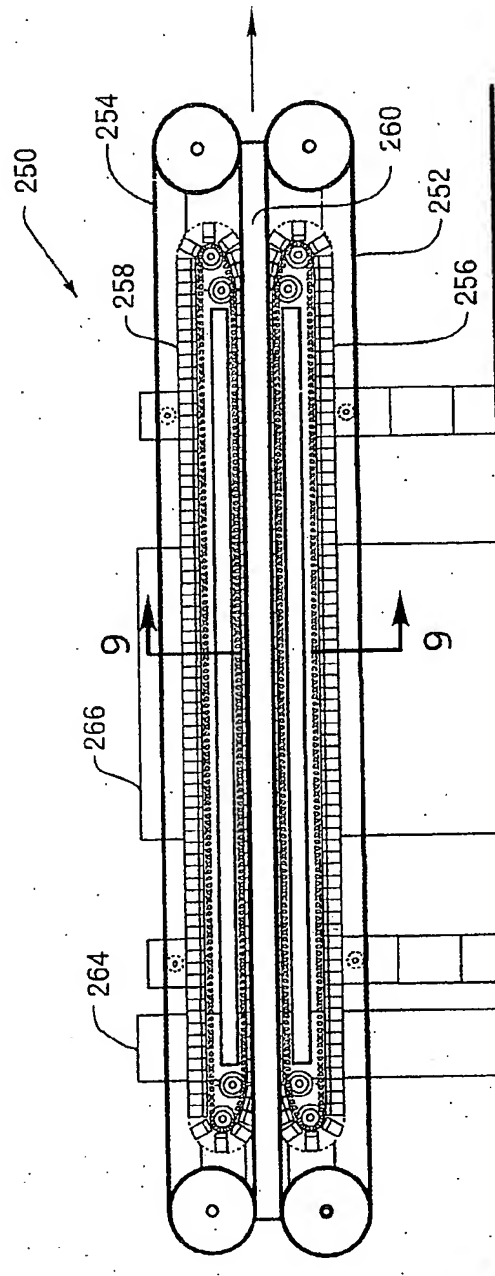


FIG. 7



Title: CONTINUOUS FORMING APPARATUS FOR THREE-DIMENSIONAL FOAMED PRODUCTS

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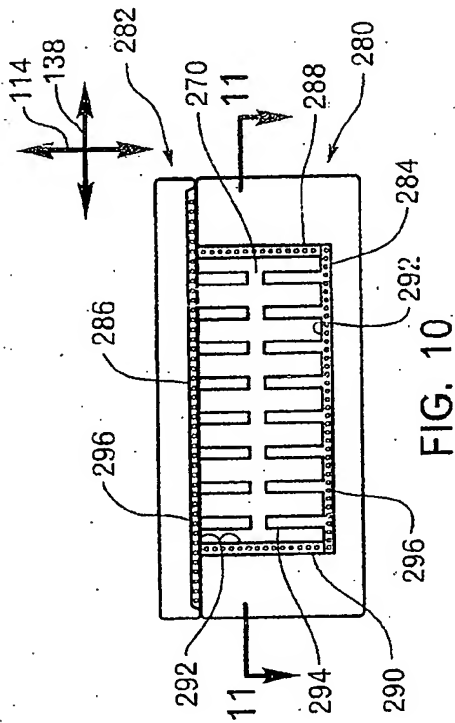


FIG. 10

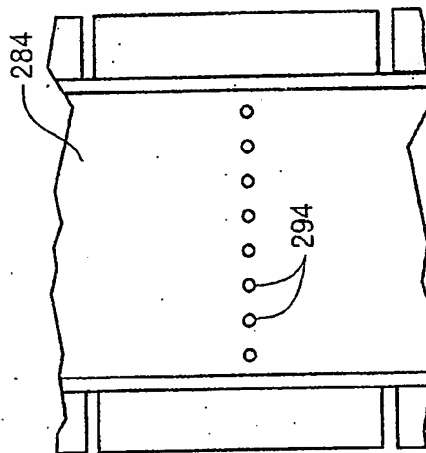


FIG. 11

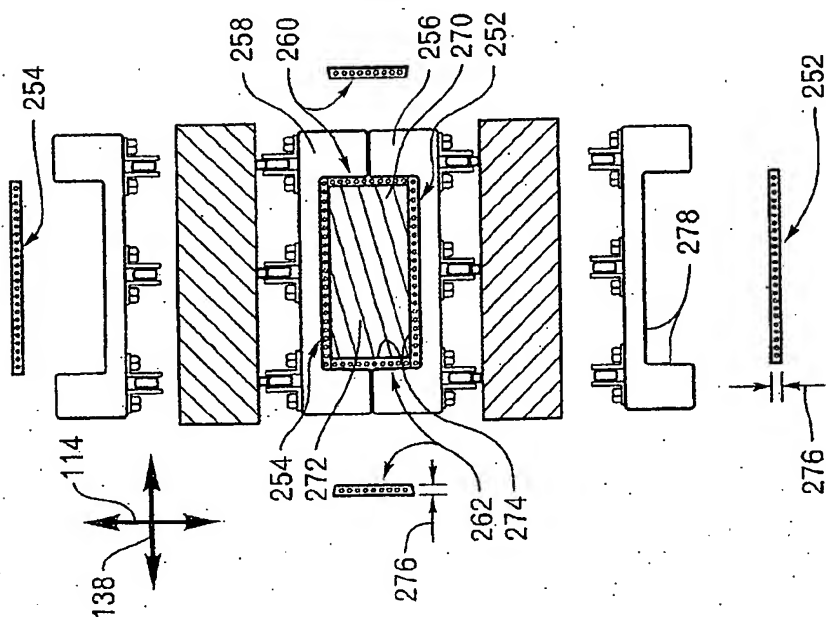


FIG. 9

Title: CONTINUOUS FORMING APPARATUS FOR THREE-DIMENSIONAL FOAMED PRODUCTS

Inventor: Zachary Taylor

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REPLACEMENT SHEETS

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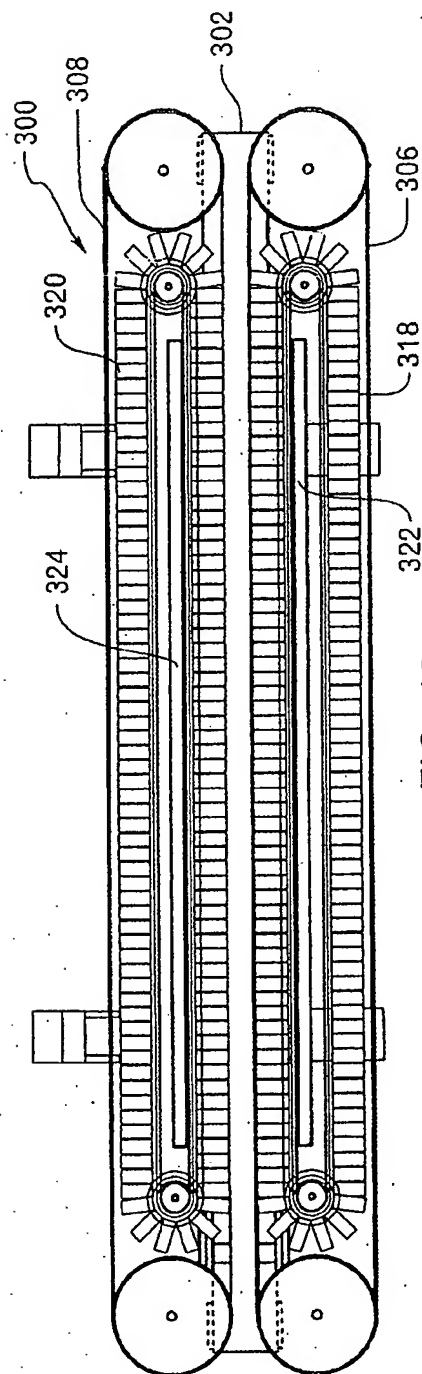


FIG. 13

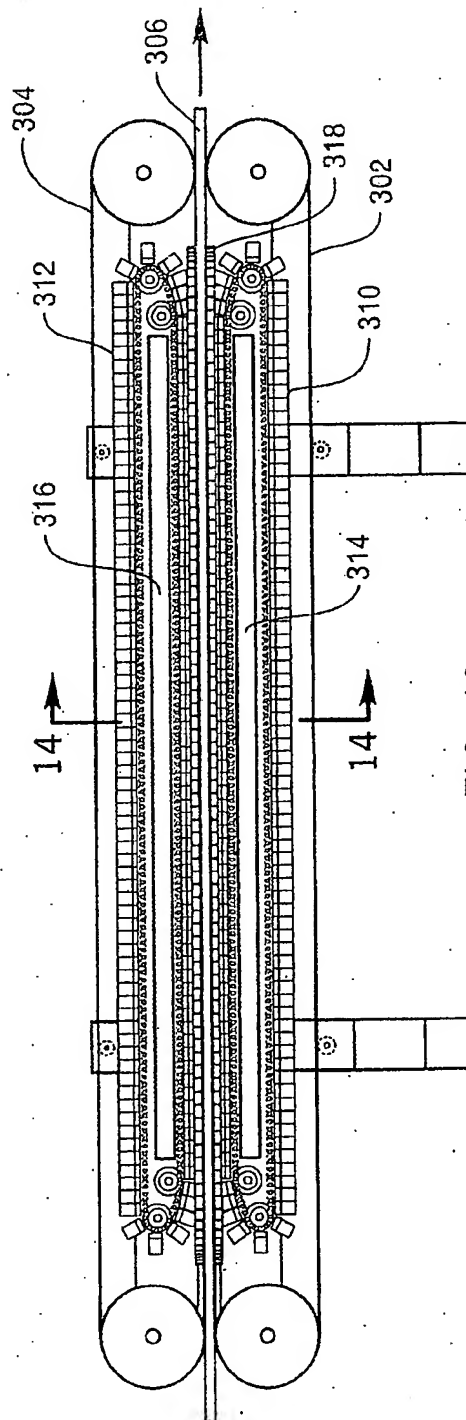


FIG. 12

Title: CONTINUOUS FORMING APPARATUS FOR THREE-DIMENSIONAL FOAMED PRODUCTS

Inventor: Zachary Taylor

Serial No.: 11/165,071

Docket No.: 3538.2.1

REPLACEMENT SHEETS

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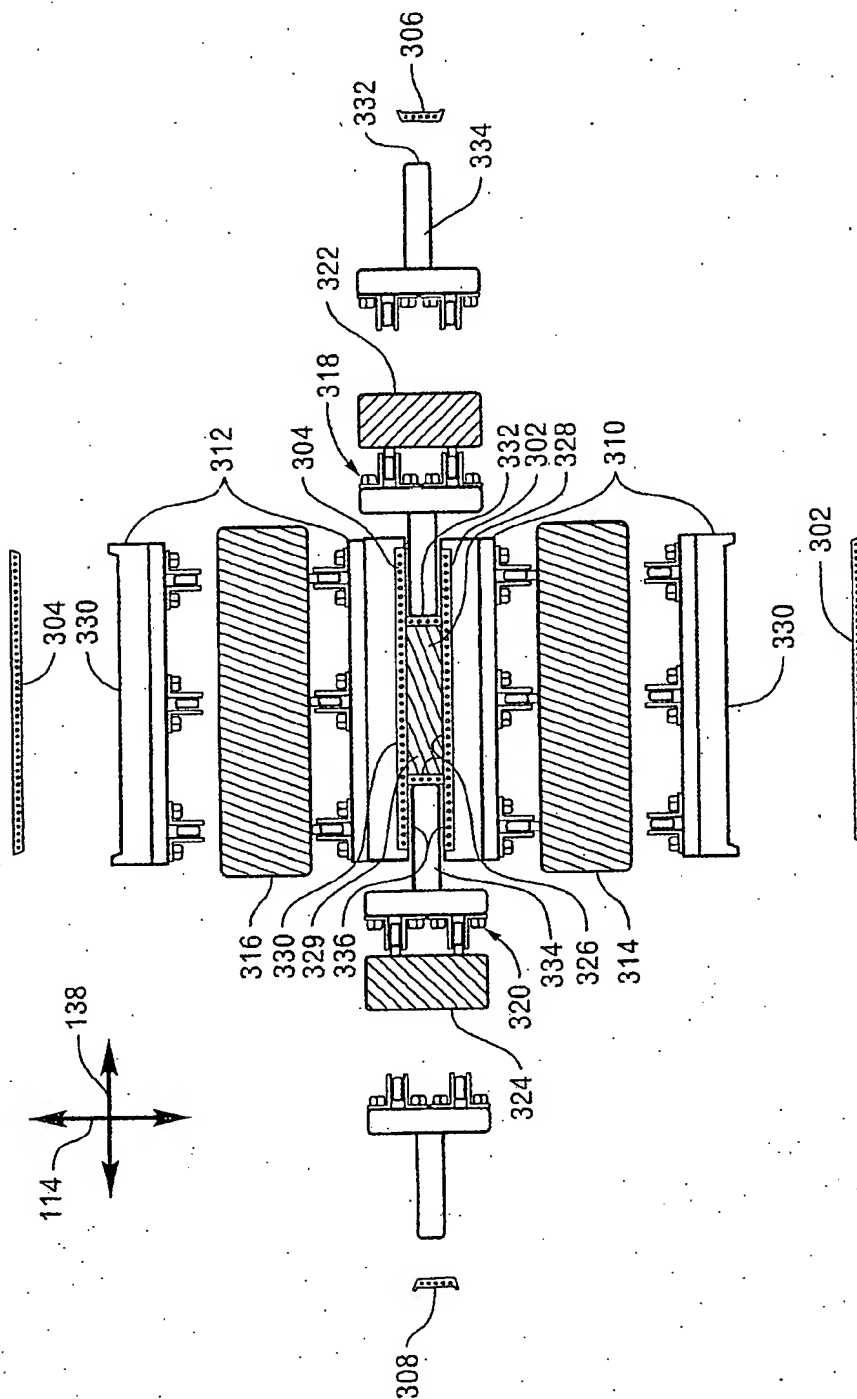


FIG. 14

Title: CONTINUOUS FORMING APPARATUS FOR THREE-DIMENSIONAL FOAMED PRODUCTS

Inventor: Zachary Taylor

Serial No.: 11/165,071

Docket No.: 3538.2.1

REPLACEMENT SHEETS

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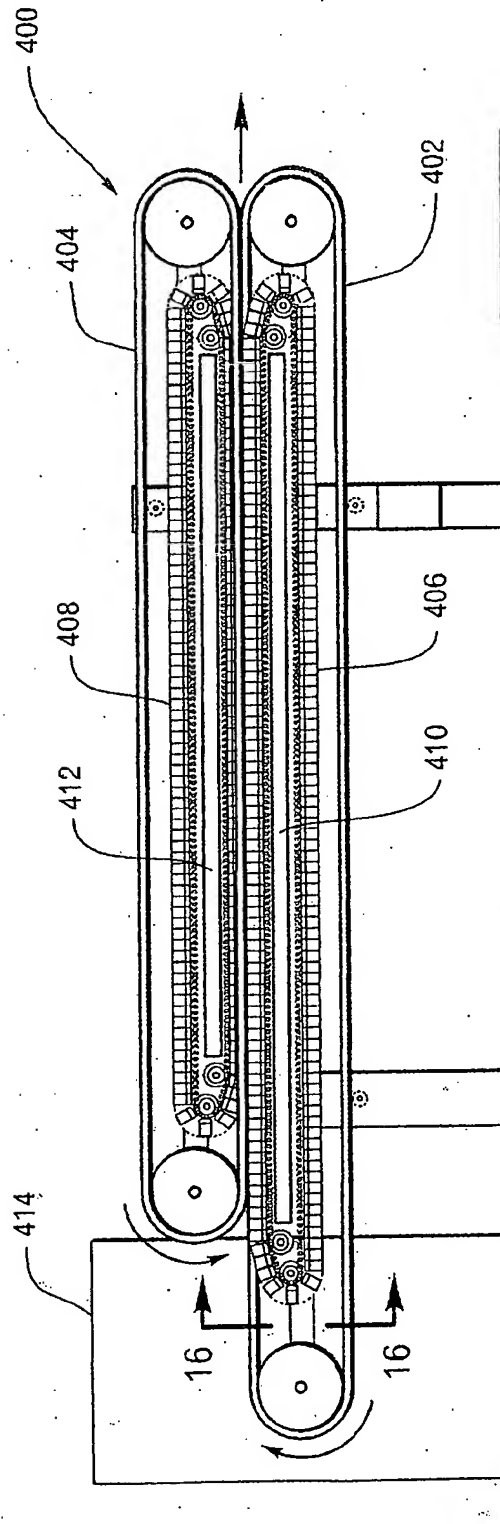


FIG. 15

Title: CONTINUOUS FORMING APPARATUS FOR THREE-DIMENSIONAL FOAMED PRODUCTS

Inventor: Zachary Taylor

Serial No.: 11/165,071

Docket No.: 3538.2.1

REPLACEMENT SHEETS

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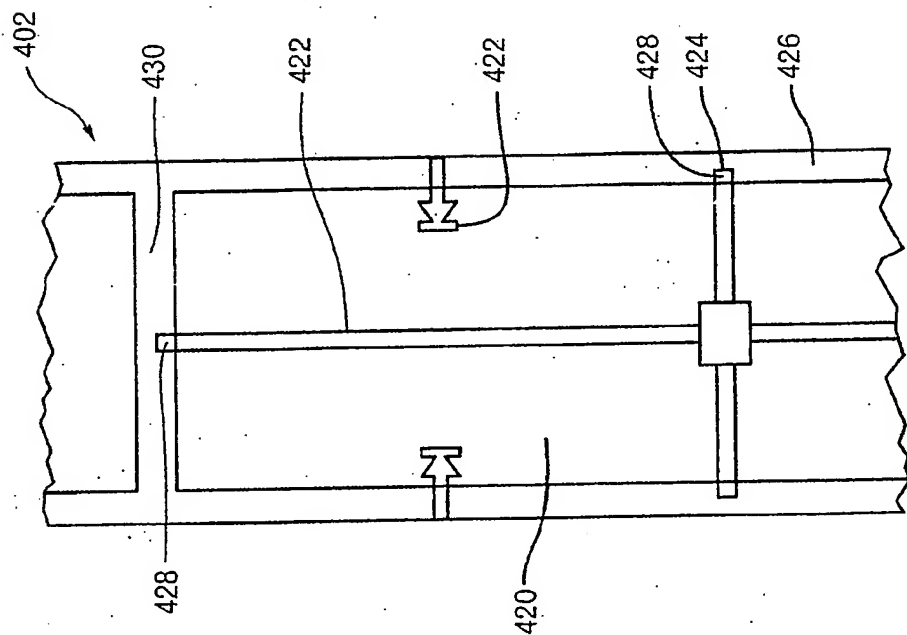


FIG. 17

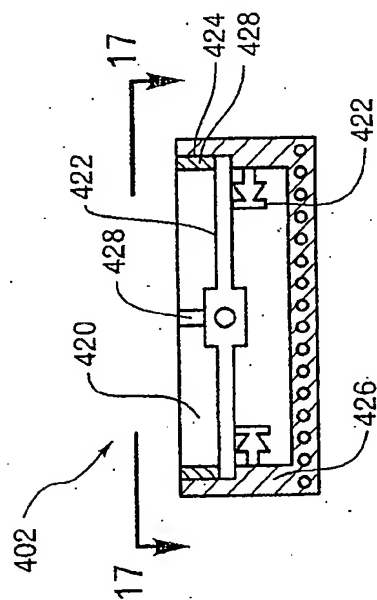


FIG. 16

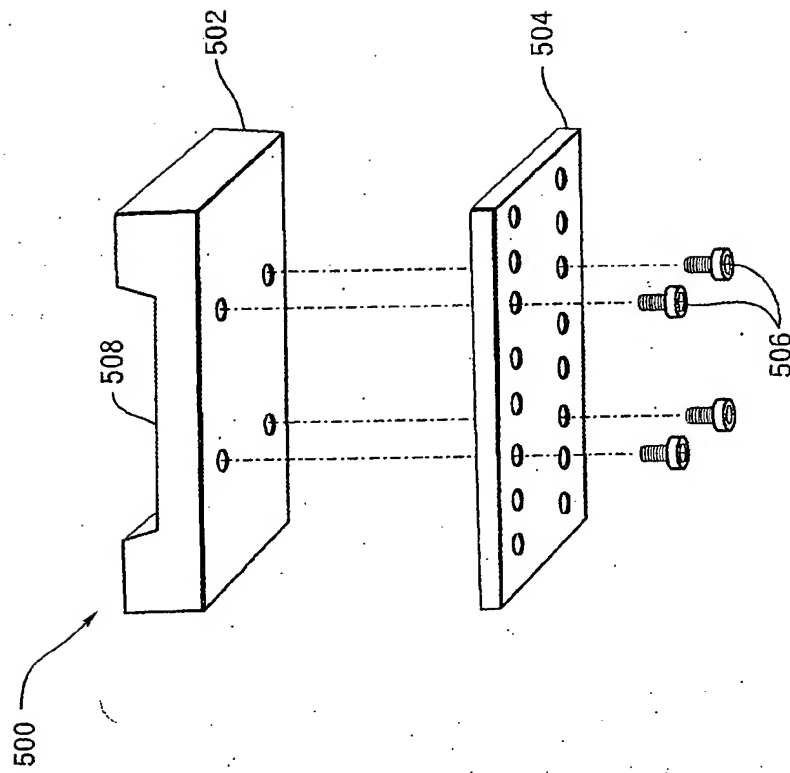
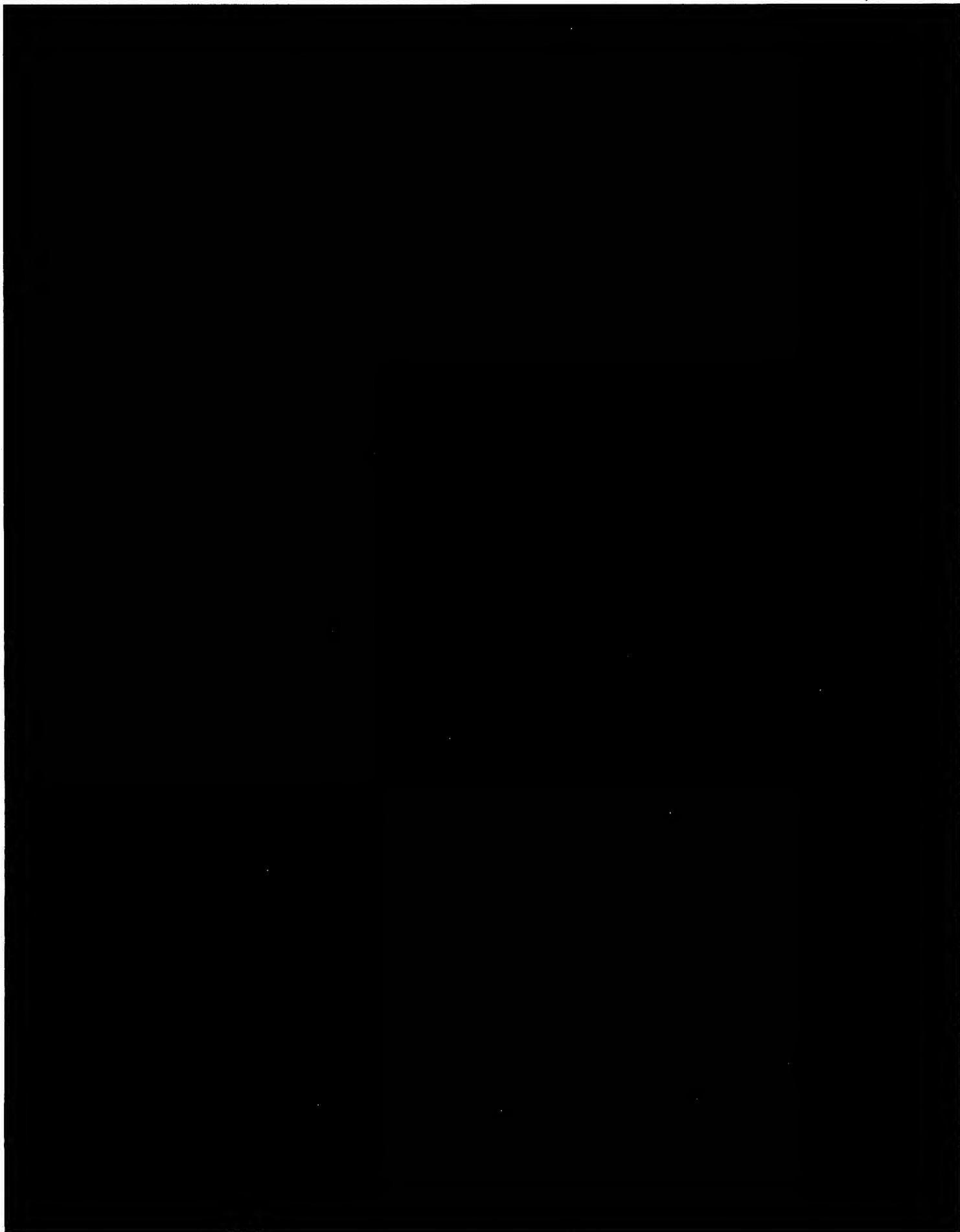


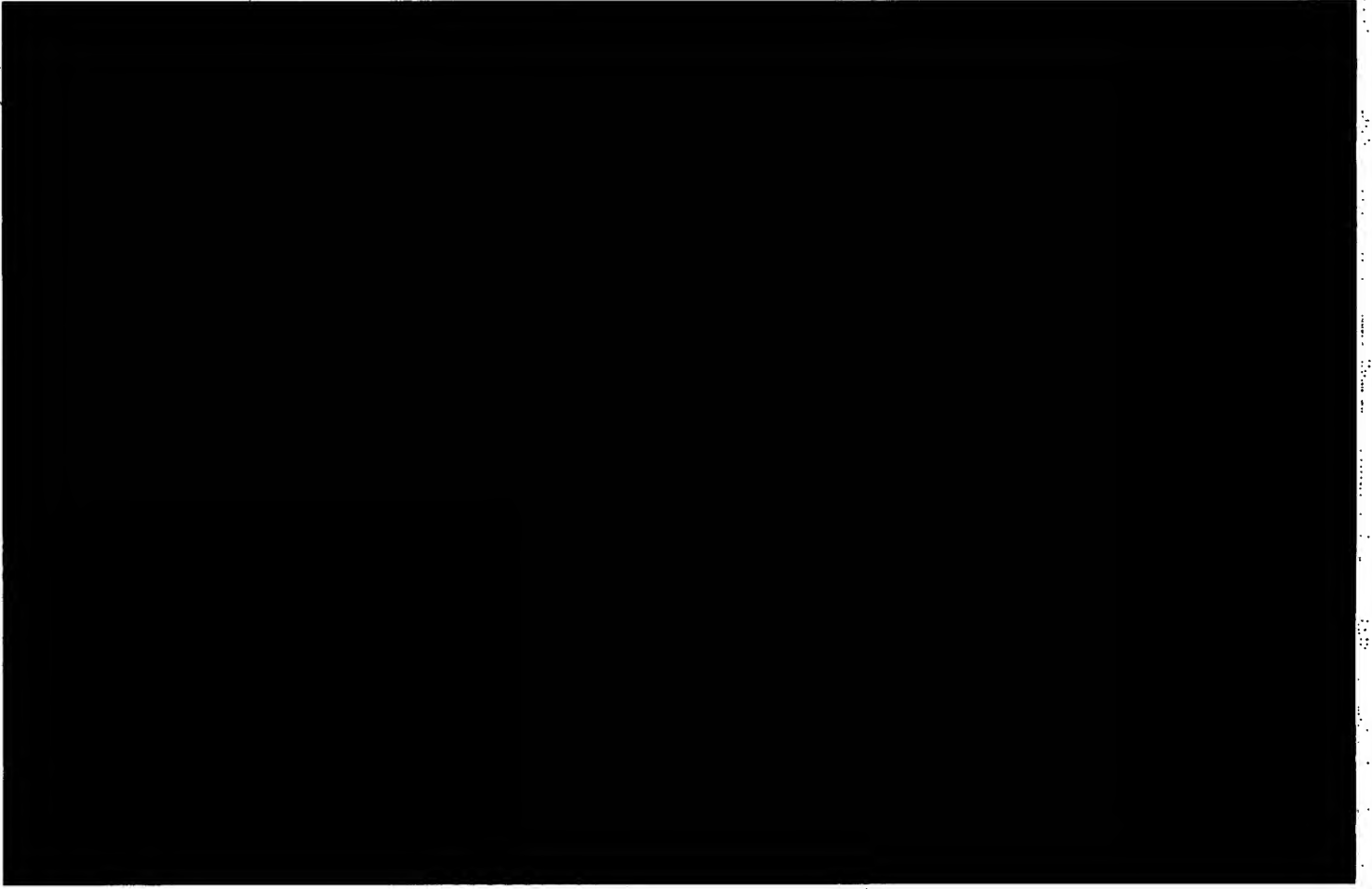
FIG. 18

# Tab 10

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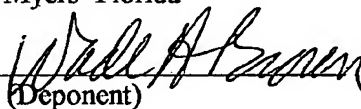
Deposition of: Wade Brown  
Date of Deposition: Nov 21, 2005  
In the matter of: Century-Board & Century Products  
[Volume III, Corrected Dec 27, 2005]

The following are the corrections which I have made to my transcript:

PAGE #	LINE #	CORRECTION	REASON FOR CORRECTION
460	6	Supplies to supplied us	misheard
463	24	Coperion's to Leistriz's	misspoke
465	4	Coperion to Leistriz	
468	19	Glomerated to agglomerated	spelling
484	17	Are to is	
508	12	Tisdale to Teasdale	spelling
511	2	Tisdale to Teasdale	
511	21	Tisdale to Teasdale	
541	21	bounce to balance	
565	5	Coperion to Leistriz	
566	10,12,14	Berstore to Berstorff	
566	15	Remove 'what'	
570	21	Add: 'The drawings on pages 2132 through 2140 are from the 2 <sup>nd</sup> Zack Taylor apparatus provisional patent application.'	

I, the undersigned, declare under penalty of perjury, that I have read the above-referenced deposition transcript and have made any corrections, additions or deletions that I was desirous of making; that the transcript contains my true and correct testimony.

EXECUTED this 27th day of December  
2005,  
at Fort Myers Florida

  
(Deponent)